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A Brief Typology and Chronology of Corinthian Transport Amphoras

Abstract

Ancient Corinth is thought to have produced three series of transport amphoras in the Greek period. Corinthian Types A and A', which are related in shape, in method of manufacture, and sometimes in fabric, have been securely attributed to Corinth. Type A was produced from the end of the 8th through the 4th century B.C. It is easily recognized by its red and gray clay with many large inclusions, its spherical body and projecting rim. Type A', which began by the early 5th century and continued at least into the 2nd century B.C., can be distinguished by its ovoid body and, after the mid-fifth century, by its coarse yellow fabric. Corinthian Type B was perhaps also produced at Corinth, although the Corinthian colony of Corcyra seems to have made at least some jars in this series. Manufactured from the last quarter of the 6th into the 2nd century B.C., Corinthian B jars have a fine fabric of yellow or light reddish brown and are typical of Greek amphoras in the shape of their body and its evolution from a short, squat form to a taller, thinner one. All three types were shipped primarily westward to Sicily and Magna Graecia, although a few are found in the region of the Black Sea.

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A Brief Typology and Chronology of Corinthian Transport Amphoras

Corinth is now recognized as one of a number of Greek city-states known to have made and exported the large, coarseware jars used for the storage and transportation of commodities in bulk.[1] Corinthian amphoras are not mentioned in the ancient literature, but archaeological evidence has made possible the identification of as many as three classes that can be linked with that ancient emporium. Two of these, termed Corinthian A and A', which are related in style, in their method of manufacture, and sometimes in fabric, have been securely attributed to Corinth. There is some evidence that the third class, known as Corinthian Type B, was also produced at Corinth, although the Corinthian colony of Corcyra seems to have manufactured at least some jars in this series. Here follows a summary definition of each type and a chronological outline of their development in shape, with general indications of their distribution.

Type A

Type A amphoras grew out of the tradition at Corinth that produced large, globular storage jars in the Geometric period.[2] By the end of the 8th century B.C., the Corinthian A jar is distinguishable from other containers by its elongated, cylindrical toe and its vertical handles, which made it maneuverable. The class is also characterized visually by a roughly spherical body, a broad, flat rim, and heavy handles (Pls. 1:a-c, 2:a). Until the end of their production about 300 B.C., Corinthian A jars were largely hand-built, which seems to be exceptional for transport amphoras in the Archaic and Classical periods.[3]

Throughout its period of manufacture, the fabric of Corinthian A is strikingly uniform and can easily be recognized by its reddish color and large, angular inclusions. It is very hard, sometimes almost vitreous, with an extremely fine clay matrix containing quartz silt and chert.[4] Most often the core is gray (5YR 6/1) with outer reddish layers (2.5YR 6/6 to 7.5 YR 7/6), but the cross-section can be all red or all gray.[5] External surfaces are usually a lighter pinkish-orange (7.5YR 7/4 to 7/6). In the second half of the 4th century (and sometimes earlier), a wash of an iron-rich material was painted or wiped on the exterior and occasionally on the upper neck interior in striking swirls of deep red or dark gray.[6]

The numerous and distinctive red and gray inclusions in Corinthian A fabric, which average 1--2 mm. in size, have been identified by petrological analysis as mudstone and tuffite containing microfossils of radiolaria. Such inclusions have also been identified in roof tiles found in kilns at Corinth, as well as in terracotta sculptures and local coarsewares such as perirrhanteria and hydriai. The sources of this temper have been located in the immediate vicinity of ancient Corinth, including prominent outcrops on Acrocorinth.[7]

Corinthian A jars accompanied the numerous other exports shipped from Corinth to the west during the period of Greek expansion in the later 8th and 7th centuries B.C. In fact, the chronology of the beginning stages of shape for Type A depends chiefly upon examples excavated at coastal settlements around southeast and central Sicily and in Magna Graecia. Most of these have been recovered from cemeteries, where such containers were frequently reused as cinerary urns or as coffins for infants. Jars found with grave offerings of Protocorinthian pottery at Schirone near Metaponto and at Gela establish the Corinthian A amphora series as one of the first produced in Greece.[9]

The next stage of development is represented by a Type A jar found in a stratified well deposit of the third quarter of the 7th century (Pl. 1:a).[9] Considerable skill and care were expended in precise trimming of rim and bevelled cap toe, qualities which marked the many diverse products of the Corinthian ceramics industry which flourished at this period. Amphoras very like this one appear at Camarina on the southeastern coast of Sicily at the time of its foundation a quarter of a century later and other jars from the Archaic cemetery there indicate the evolution in shape of Type A throughout the 6th century B.C.[10]

Other finds at Corinth mark sixth-century stages in the trend toward a more sharply curving body, a narrower toe and neck, and a less massive rim.[11] By the beginning of the 5th century, these tendencies result in the slightly flattened shoulder of the small Type A amphora from a well in the Athenian Agora (Pl. 1:b).[12] Its cylindrical toe is distinct in profile from the body, and its handles are slightly pinched at the top, so that their section is no longer round but increasingly ovoid. Larger counterparts of this amphora were widely exported throughout the Greek world in the later 6th and early 5th centuries, as finds from Gela to the Elizavetovskoe settlement on the Don demonstrate.[13]

In the first quarter of the 5th century, the upper surface of the horizontal Type A rim begins to slant down (Pl. 1:c); by the mid-fifth century, the handles, now more sharply pinched at the top, are occasionally stamped at the base with a palmette.[14] The generally spherical shape of the body on Type A jars continues to the end of their manufacture at the close of the 4th century (Pl. 2:a).[15] Immediately recognizable characteristics of such jars are a peg toe (which provides a firm grip for lifting) and a heavier, overhanging rim which rests on the spiny top edge of the handles. In section the handles are triangular or teardrop-shaped at the top and round or slightly oval at the bottom. A palmette is sometimes stamped at the base of one or both handles in the second half of the 4th century; occasionally a single letter or monogram appears on the upper flat side of either handle.[16] Nearly all Corinthian A jars known of the 5th and 4th centuries have been found at Corinth.

Type A'

Corinthian Type A' (Pl. 2:b, c) was isolated as a distinct class of amphoras when numerous fragmentary examples were excavated in a fifth-century establishment at Corinth known as the Punic Amphora Building.[17] Type A' can be differentiated from Type A in the ovoid shape of its body and, particularly after the middle of the 5th century, in its fabric. It shares with Type A, however, an overall similarity of shape and in particular the broad, sloping rim; the method of construction by hand; and, before the mid-fifth century, sometimes also the same clay and/or mudstone inclusions.[18] Appearing alongside Corinthian A at least by the early 5th century B.C., Type A' continued through the 4th century and apparently replaced Type A in the 3rd and 2nd centuries B.C. It seems to have functioned largely as an export container, ending up, like Corinthian A jars in an earlier period, primarily in Sicily and Magna Graecia.

Generally speaking, Type A' jars are related in fabric to most of the common types of Corinthian ceramics; with the exception of some in the earliest decades of their production, they are made of fine yellow clay and the usual inclusions after the mid-fifth century are fine quartz sand, chert, and lime.[19] The surface of Corinthian A' jars is light pink to light yellow (ranging from 10YR 8/2 to 10YR 8/3 to 7.5YR 7/4) and exhibits no treatment beyond the final wiping or smoothing. In cross-section the color is generally pink (5YR 8/4 to 7.5YR 7/4); often there is an outer layer of the same color as the surface.

Corinthian A' jars show some evolution of form, although after the middle of the 5th century the lack of well dated excavation contexts and the profusion of variations makes it hard to establish a clear linear development.[20] In the later 5th and the 4th centuries, the slope of the overhanging rim gradually steepens, as on contemporary Type A jars. The neck narrows and the high shoulder broadens (Pl. 2:b). Handles are curved in plan and round in diameter, decreasing in size toward the bottom. Stamps on the handles are infrequent in this period, but there are a few, some similar to those found on Type A.[21]

In the beginning of the 3rd century, the production of Type A' seems to have expanded, even as that of Corinthian A ceased. Numerous fragments of such amphoras which were found (together with Type B jars) in a shipwrecked cargo at Stentinello near Syracuse and another at Savelletri near Brindisi suggest extensive Corinthian exports in the first half of the 3rd century B.C. and show further stylistic evolution.[22] The point of maximum diameter on the ovoid body of Corinthian A' has dropped to the center; the cap toe is conical. Gradually the slant of the rim steepens and acquires a bevel at about its midpoint. The latest pieces from the Savelletri cargo, which are similar to a jar from Corfu (Pl. 2:c), demonstrate that by the middle of the 3rd century the collarlike rim is nearly vertical, the neck flared toward the bottom, and the toe enlarged, with compound curve in profile. Stamps occur rarely and include three names.[23]

Type B

Corinthian Type B amphoras are marked by a more or less ovoid body, a flaring rim, and vertical, arched handles (Pls. 3, 4). These jars were manufactured from about 525 to at least the late 3rd century and probably into the 2nd century B.C. Type B jars were exported primarily to the west, and are found at many sites where Type A and A' jars have been recovered.

Corinthian B fabric is generally light in color and fine in texture. Petrological analysis has shown that throughout their production Type B jars were made predominantly of the yellow clay that characterizes most Corinthian ceramics; surface and interior are usually light pink to light brownish yellow (5YR 8/4 to 7.5YR 7/4). After the third quarter of the 4th century, however, some appear instead in a fabric that is similar to the first but light reddish-brown in color (2.5YR 6/6). Inclusions are mostly small ones of quartz and chert, with no mudstone or tuffite; small voids or pores are often noticeable in cross-section.[24] The surface of jars made from yellow clay is finished simply by wiping or smoothing, but the reddish-brown jars of the first half of the 3rd century are usually covered with a pale buff slip.

Originally the Type B series was tentatively assigned by Virginia Grace to the Corinthian colony of Corcyra.[25] An ancient source that has come down to us as part of the Aristotelian corpus describes a centralized market in northern Greece to which merchants come from the Pontus with Lesbian, Chian, and Thasian goods, and others from the Adriatic with Corcyraean amphoras.[26] The relatively small number of Corinthian B jars and stamped handles found on Corfu and in the waters around it were candidates for the class to which he referred, since very few amphoras of any other type had been excavated on the island. Nevertheless, although Κερκυραικοὺς ἀμφορεῖς indicates that the type was associated with Corcyra, it does not exclude that the jars so named could have been manufactured elsewhere as well. Other evidence links the Type B series to Corinth, where increasing numbers of them have been excavated in the past two decades. Type B jars found at Corinth document the whole range of development of the series and, at 416 inventoried pieces, outnumber any other contemporary amphora type found at Corinth (including even the Corinthian A and A' series, of which the inventoried examples at Corinth together total 324). Analysis by neutron activation has in fact matched the fabric of Type B jars with that of other Corinthian pottery.[27]

More recent analyses using optical emission and Mössbauer spectroscopy have separated Type B jars into two fabric groups on the basis of (respectively) chemical composition and the nature of the iron in the clay. Those results linked some of the test group of amphoras with the control group of coarsewares from Corinth, as had the neutron activation study, but they also matched other Type B jars with coarse pottery made on Corfu. The two techniques did not assign individual jars to the same group

in every case, but the general conclusion was clear: at least some Corinthian B jars were made in Corcyra from the Archaic period through the early 3rd century, at the same time that they were being produced in Corinth.[28]

The two groups of Type B amphoras established by physico-chemical analyses can not be distinguished either stylistically or petrologically; further evidence is needed for a complete explanation of the manufacture of the Corinthian B series.[29] Very recent excavations in a potters' quarter on Corfu offer direct evidence for the attribution of at least some Corinthian Type B jars. A large area with several kilns has revealed quantities of fragments and kiln wasters of Type B amphoras which date from the second half of the 5th to the mid-third centuries B.C.[30] This does not rule out the possibility that Type B jars were also made at Corinth. In any case, the many examples from shipwrecks and other sites show that Corinthian A, A' and B jars were often shipped together; the network of distribution, at the least, seems linked to Corinth. Until the relationship of Corinth and its colony of Corcyra in the matter of production and export of these containers can be more fully explained, it seems best to retain the current nomenclature for the series.

Amphoras of the Corinthian B series exhibit a quite regular evolution of profile. Numerous jars and fragments dated by context at both Corinth and Athens attest the shape of the earliest Type B jars, which belong to the last quarter of the 6th century B.C. (Pl. 3:a).[31] Already several characteristics of the class are clearly defined: the rounded, outward-thickened rim, the ridge or offset band around the top of the neck, and the arching, vertical handles. About 480 B.C., the cylindrical toe becomes smaller and the rim flared; by the middle of the 5th century the body is ovoid and the toe a conical cap (Pl. 3:b).[32] Such jars were exported to many sites in Greece and also in the west.[33]

From this point on, the body of Corinthian B amphoras gradually lengthens and narrows, following a tendency general for most transport amphoras throughout the Greek period. From the beginning of the 4th century, the toe is formed together with the body and continues its line, although initially it is articulated by a deep groove (Pl. 3:c).[34] By the end of the 4th century, neck and handles are taller, and the elongation of the body is even more pronounced (Pl. 4:a).[35] Often a wide band of shallow grooves accentuates the broad, high shoulder, possibly the impression made by a girdle of sticks as the vessel dried.[36] The upper neck, still with a ridge or groove (or two) around its top, is oval and the flaring rim is pinched where it rises over the handles, so that in plan view it often resembles a figure-eight.[37]

The still more exaggeratedly piriform body of the jar in Pl. 4:b can probably be dated toward the end of the first quarter of the 3rd century B.C., since it seems to be a slightly later stylistic stage than the 18 Type B jars from a deposit buried in

the destruction of Gela in 280 B.C.[38] Its shoulder slopes somewhat more, and the rim, although still flared, is more compact and has an almost triangular section. The latest of the Corinthian B necks from the Stentinello wreck are approximately contemporary with the important group at Gela; somewhat later still and datable to the second quarter of the 3rd century are the pieces from the shipwreck at Savelletri.[39] These and other groups in the west show that the period of greatest export of Corinthian B amphoras was in the latter part of the 4th and first half of the 3rd century B.C.[40] On the Corinthian B jar tops from Savelletri, the rim shortens to a roll, above which the heavy handles arch, and the toe develops a slight bulge at its tip. At about the middle of the 3rd century, the point of maximum diameter drops well below the shoulder, as illustrated by the biconical body on an intact find in Patras from the sea (Pl. 4:c).[41]

Not much later there is a major, perhaps abrupt, change in Corinthian B jars: The shoulder becomes less angular and the neck smaller in proportion to the whole body, with a small rim that is semi-circular in section. Most strikingly, the handles now lose their arch and attach below the rim.[42] Examples of this latest stage in the development of Type B have appeared recently in excavations at Corinth but cannot be dated more closely than the mid-third to second century B.C.; presumably their production ceased when the Romans under Mummius sacked the city in 146.

Stamps appear on some Corinthian B jars primarily after the middle of the 4th century, impressed either on the top of the curve of the handle or at its lower attachment. More jars seem to have been stamped in the late 4th and early 3rd centuries; for instance, 8 of 18 Type B amphoras in the deposit at Gela bear stamps. Some 400 different dies are known. Generally, single letters, ligatures, or simple monograms were impressed on the top of a handle or at its base, but small pictorial devices were also popular.[43] These are likely to be potter's marks, but their significance remains uncertain. Dipinti, nearly always in red and showing one to three letters, a ligature, or a monogram, occur with some regularity.

There is little mention of commodities that might have been carried in the jars of these three series; wine and oil are the most obvious candidates. The reputation of Corinthian wine suggests that it would have been exported strictly as <u>vin ordinaire</u>: Athenaeus quotes Alexis, a poet of Middle Comedy, as despising Corinthian wine as hard (σκληρός)--torturously bad, in fact: οἶνος ξενικὸς παρῆν· τὰ γὰρ Κορίνθια βασανισμός ἐστι.[44] (Corcyraean wine, on the other hand, is mentioned in the <u>Deipnosophistae</u> as taking aging very well: χαριέστατος δ' οἶνος εἰς παλαίωσιν ὁ Κερκυραῖος.[45])

Analyses using gas chromatography have not to date identified organic material representing the original contents of A, A' or B amphoras. A very tentative hypothesis or two may be

suggested, however. It is possible that Corinthian B carried wine, since Type B jars were coated on the interior with a resinous substance which kept the liquid from soaking into the porous fabric of the container, a practice known to have been used for jars that carried wine or semi-liquid contents (but not oil).[46] In turn, the fabric of Type A jars can be associated with that of oil-carrying lekythoi, lamps, and other vessels of the 5th and 4th centuries made at Corinth of blisterware, a clay related to that of Type A.[47] Certainly the hardness of blisterware vessels and of Corinthian A jars was well adapted to withstand erosion caused by oil, and their impermeable walls would not have required any lining.[48] Type A' jars, on the other hand, were permeable and would have had to be coated with ~~resin~~, beeswax or some other substance that would not have spoiled the contents. No trace of a lining on Corinthian A' amphoras is known.

Direct measurements of capacity have been taken for together nearly 200 jars of the three Corinthian types.[49] For some amphora classes in some periods a size or series of sizes can be recovered, but sizes have not been recovered for Corinthian A and A'.[50] Type A jars are on the whole much larger than those of other Greek amphora series; in all periods they held various amounts, the smallest about 18 liters, the largest 70, and the majority above 40. Type A' jars range in size from roughly 18 to 50 liters. With Corinthian B amphoras, however, the results have been more promising. Their span for the entire period of production is 19.3 to 27.6 liters, with some jars of a much smaller size, but for the early 3rd century Corinthian B jars seem to have achieved a certain intended size. Ten jars at Gela from the deposit in the Via Polieno (see above) which were measured with water held a mean of 25.0 liters +/- one standard deviation of 0.995 liter. Further measurements of chronological groups of intact Corinthian A, A' and B amphoras, when these are available, will determine whether there were "normal" sizes for Type A and A' jars as well, and for Type B jars in other periods.

Corinthian amphoras furnish important evidence about the economics and trade not only of Corinth but of the wider Greek world as well. I.B. Brashinskii and I.B. Zeest have shown that they formed at least some part of exports to the Black Sea and other areas to the northeast of the Greek mainland. Corinthian jas have not been identified hitherto in any great amount in these regions, but it is hoped that this survey will help to bring about an assessment of their role in such trade.

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Notes

[1]I thank the Texas Antiquities Commission for permission to reprint as Pls. 1--4 here Figs. 1 and 2 from C.G. Koehler, "Evidence around the Mediterranean for Corinthian Export of Wine and Oil," in J. Barto Arnold, III, ed., Beneath the Waters of Time: The Proceedings of the Ninth Conference on Underwater Archaeology, Texas Antiquities Committee Publication 6, Austin 1978, pp. 231--239 (referred to below as Koehler 1978). I am very grateful to M.B. Wallace for useful comments on earlier versions of this paper.

The results of the author's study of Corinthian amphoras first appeared as Corinthian A and B Transport Amphoras, Ph.D. dissertation, Princeton University 1978. In updated form the full work will soon appear as Corinthian Transport Amphoras. The following, with the short references used when they appear in this article, are interim publications on various aspects of the topic: "Corinthian Developments in the Study of Trade in the Fifth Century," Hesperia 50, 1981, pp. 449--458 (Koehler 1981); "Amphoras on Amphoras," Hesperia 51, 1982, pp. 284--292 (Koehler 1982); P.B. Vandiver and C.G. Koehler, "Structure, Processing, Properties and Style of Corinthian Transport Amphoras," in W.D. Kingery, ed., Technology and Style, Ceramics and Civilization 2, Columbus, Ohio 1986, pp. 173--215 (Vandiver and Koehler 1986); I.K. Whitbread, The Application of Ceramic Petrology to the Study of Ancient Greek Transport Amphorae, with Special Reference to Corinthian Amphora Production, Ph.D. Dissertation, University of Southampton 1986 (Whitbread diss.).

[2]C. Pfaff, "A Geometric Well at Corinth: Well 1981-6," Hesperia 57, 1988, pp. 21--80, at 29--31, traces the development of the coarseware storage amphora in the Geometric period at Corinth. See also Koehler 1981, p. 451, pl. 98:a (where for C-1962-162 read C-1972-162).

[3]Corinthian A bodies and rims were always shaped by hand (as Geometric pots had been), and so also the necks until the second half of the 4th century, when they began to be thrown on the wheel (Vandiver and Koehler 1986, pp. 182, 187).

[4]Whitbread diss., pp. 339--343. For a brief summary of the petrological analyses of Corinthian amphoras, see I.K. Whitbread, "The Characterisation of Argillaceous Inclusions in Ceramic Thin Sections," Archaeometry 28, 1986, pp. 79--88, at pp. 84--86; idem, "The Application of Ceramic Petrology to the Study of Ancient Greek Amphorae," in Empereur, J.-Y. and Garlan, Y., eds., BCH Suppl. 13, Recherches sur les Amphores Grecques, Paris 1986, pp. 95--101, at pp. 97--100.

[5]Alphanumerical descriptions in parentheses are taken from the Munsell Soil Color Charts, Baltimore 1975.

[6]Semiquantitative surface analysis using non-destructive x-ray fluorescence spectrometry, undertaken in 1976 by R.E. Jones of the Fitch Laboratory, British School at Athens.

[7]Whitbread diss., pp. 339--343, analysis of Type A; pp. 363--378, other Corinthian ceramics. Location of temper, M. Farnsworth, "Corinthian pottery: Technical Studies," AJA 74, 1970, pp. 9--20, at pp. 9--11; Whitbread diss., pp. 389--391.

[8]Koehler 1981, p. 451, pl. 98:b; D. Adamesteanu, La Basilicata Antica: Storia et monumenti, [Cava dei Tirreni], Di Mauro 1974, p. 112 and photograph p. 113, left, of an amphora from the necropolis at Schirone (Policoro); idem, "Predio La Paglia [Gela]. Nuovi ritrovamenti nella necropoli archaica," NSc 10, 1956, pp. 281--288, at pp. 285--286, fig. 6 and Koehler 1978, fig. 3a. There are numerous other exports of Corinthian jars, but here and in the notes that follow only a few representative examples with published illustrations can be cited.

[9]C-1962-644: D.A. Amyx and P. Lawrence, Corinth, VII, ii, Archaic Corinthian Pottery and the Anaploga Well, Princeton, 1975, nr. An 306, pp. 157--158, pls. 79, 110 and Koehler 1981, p. 451, pl. 98:c; cf. An 288, 290, and 304, on pp. 154, 155, 157, pls. 80, 81, 110. For a contemporary vessel of large size, see P. Orlandini, "Villa Garibaldi, Nuovi ritrovamenti nella necropoli arcaica," NSc 10, 1956, pp. 291--316, at pp. 291--293, fig. 5:a.

[10]Thanks go to P. Pelagatti, then Superintendent of Antiquities for Eastern Sicily, for making it possible for me to examine jars at Camarina in 1974 and 1979 and to mention them.

[11]Jar of the 580's or 570's, C.K. Williams, II, "Corinth 1977, Forum Southwest," Hesperia 47, 1978, pp. 1--39, nr. 1, pp. 5, 8, 34, pl. 1 and Koehler 1981, p. 452, pl. 98:d; jar of the second quarter of the 6th century, E. Brann, "A well of the 'Corinthian' period found in Corinth," Hesperia 25, 1956, nr. 59, pp. 365--366, pl. 58 and Koehler 1981, p. 452, pl. 98:e.

[12]P 12795: V.R. Grace, Amphoras and the Ancient Wine Trade, rev. ed., Agora Picture Book 6, 1979, fig. 35, left; Koehler 1981, p. 452, pl. 98:f.

[13]D. Adamesteanu, "Scoperta di tombe greche in Via Francesco Crispi," NSc 14, 1960, pp. 137--151, at p. 141, fig. 6:b; Tomb 4 contained a miniature Corinthian skyphos dated to the early 6th century (ibid., fig. 7:b, p. 137) which could, according to D.A. Amyx, belong to the second half of the 6th century as well (personal communication). Exports to Elizavetovskoe: I.B. Brashinskii, "New materials toward the study of economic relations of Olbia in the sixth to fourth centuries B.C.," Archeologia 19, 1968, pp. 45--59, at pp. 45--48; idem, "New evidence of Greek imports in the Lower Don, according to materials found in the Elizavetoskoe townsite and cemetery," Brief Communications of the Institute of Archaeology of the

Academy of Sciences of the U.S.S.R 124, 1970, pp. 12, 16--18; I.B. Zeest, Pottery Containers of the Bosporos, Moscow 1960, p. 71, fig. 1:5.

[14]C-1937-2037: M.T. Campbell, "A Well of the Black-Figure Period at Corinth," Hesperia 7, 1938, pp. 557--611, nr. 201, pp. 605--606, fig. 27; Koehler 1981, p. 454, pl. 98:g. For a jar of the mid-fifth century, see M.Z. Pease, "A Well of the Late Fifth Century at Corinth," Hesperia 6, 1937, pp. 257--316, no. 200, p. 303, fig. 34; Koehler 1981, p. 454, fig. 1:d, pl. 98:h.

[15]Other jars of the second half of the 4th century: S.S. Weinberg, "A Cross-Section of Corinthian Antiquities (Excavations of 1940)," Hesperia 17, 1948, pp. 190--241, nr. E 13, p. 233, pl. 85; H.S. Robinson, "A Sanctuary and Cemetery in Western Corinth," Hesperia 38, 1969, nr. 2, p. 9, pl. 2.

[16]Fourth-century Type A stamps are illustrated, e.g., in B. Adamshek, Kenchreai: Eastern Port of Corinth, 4, The Pottery, Leiden 1979, nr. Gr 82, p. 32, pl. 9 (monogram) and C.K. Williams, II, "Corinth 1978: Forum Southwest," Hesperia 48, 1979, pp. 105--144, nrs. 60--62, pp. 135--136, pl. 51 (palmettes).

[17]Koehler 1981, pp. 454--458, fig. 1:c, pl. 99:g.

[18]Whitbread diss., pp. 343--347, 355--356, 375. A further bit of evidence linking the two series is the stamp on the handle of a mid-fifth-century Corinthian A jar which illustrates the contemporary A' amphora (Koehler 1981, p. 457, pl. 99:i).

[19]Ibid.

[20]Early A' jar, Campbell 1938 (note 14 above), nr. 203, pp. 605--606, fig. 27. A' jars of the mid-fifth century: Pease 1937 (note 14 above), nr. 199, p. 303, fig. 34 and Koehler 1981, pp. 454--455, fig. 1:b, pl. 99:h (where for Metaponto read C-34-932); F.G. Lo Porto, "Metaponto: Scavi e ricerche archeologice: 5. La Necropoli," NSc 20, 1966, pp 186--231, at p. 210 and fig. 61:2 on p. 207 (fig. 61:1 shows a Type A jar of the late 6th/early 5th century); I.B. Brashinskii, Greek Imports in the Lower Don in the V--III Centuries B.C., Leningrad 1980, pl. XXII:10; see also note 17 above.

[21]For published impressions of an astragal on Type A, see M-T. Lenger, "Timbres amphoriques trouvés á Argos," BCH 79, 1955, pp. 484--508, nr. 81, pp. 503--4; on A', Kenchreai IV (note 16 above), nr. Gr 83, p. 33, pl. 9. Palmettes and a monogram that may be read AΘP or ΔPA are also known on both Corinthian A and A' jars (cf. note 16 above).

[22]G. Kapitän, "Il Relitto Corinzio de Stentinello nella Baia de S. Panagia (Siracusa)," Sicilia Archeologica 9, 1976, pp. 87--103, at 90--91, figs. 4, 5; cf. Koehler 1978, fig. 3:d. G. Kapitän, "A Corinthian Shipwreck at Savelletri (Brindisi,

Apulia, Italy)," International Journal of Nautical Archaeology 2, 1973, pp. 185--186, fig. 1; cf. Brashinskii 1980 (note 20 above), pl. XXII:7, 8.

[23]Απελλέα is the only name appearing more than once; it occurs on 11 handles, one published: J.G. Milne, Greek Inscriptions, Catalogue gènèral des Antiquitès Egyptiennes du Musèe du Caire, vol 18, Oxford 1905, nr. 26112, p. 124.

[24]Whitbread diss., pp. 347--356; I.K. Whitbread, BCH Suppl. 13, pp. 97--99.

[25]V.R. Grace apud C. Boulter, "Pottery of the mid-fifth century from a well in the Athenian Agora," Hesperia 22, 1953, pp. 59--115, at pp. 108--109, s.v. nr. 166.

[26]De Mirabilibus Auscultationibus 104, p. 839b,8. It is thought not to be the work of Aristotle, but "to have emanated from the Peripatetic School" (Aristotle, Minor Works, W.S. Hett, transl., The Loeb Classical Library, Cambridge, 1963, p. 233).

[27]M. Farnsworth, I. Perlman, and F. Asaro, "Corinth and Corfu: A Neutron Activation Study of their Pottery," AJA 81, 1977, pp. 455--468. This study resulted primarily in the assignment to Corinth of painted pottery found on Aegina and considered by some to be local. Coarseware samples were also analyzed, although at that point (the early 1960's) the extent of the problem of attributing Type B amphoras had not been defined. These neutron activation data can be reliably applied to this question, however, since control and test groups sampled on Corfu and at the Athenian Agora for those analyses were examined by the present author, re-sampled where possible, and re-tested by spectroscopic methods for comparison (cf. note 28 below).

[28]R.E. Jones, Greek and Cypriot Pottery: A Review of Scientific Studies, Fitch Laboratory Occasional Paper 1, The British School at Athens 1986, pp. 115--121, 176--189, and especially 712--720, with 739.

[29]Whitbread diss., pp. 358, 405.

[30]K. Preka, "Εργαστήριο κεραμεικής στο Φιγαρέτο Κερκύρας," abstract for the paper read at the conference, "Les ateliers du potier dans le monde grec aux èpoques gèomètriques, archaïques et classiques" held in Athens, October, 1987; publication of the same title, F. Blondè and J. Perrault, eds., forthcoming, 1990. I thank J. Perrault for the reference. Analyses of some of this material are planned for the near future.

[31]C-1937-2042: Koehler 1981, pp. 452--454, pl. 99:a; Campbell 1938 (note 14 above), nr. 192, pp. 604--605, fig. 27. Cf. ibid., nr. 193, pp. 604--605, fig. 27; Grace 1979 (note 13 above), fig. 35, bright jar in left foreground and S.R. Roberts,

"The Stoa Gutter Well: A Late Archaic Deposit in the Athenian Agora," Hesperia 55, 1986, pp. 1--72, nr. 415, p. 65, fig. 41, pl. 18. Early fifth-century examples, ibid., nrs. 416, 417, pp. 65--66, fig. 41, pl. 18; Koehler 1981, pp. 452--454, pl. 99:b.

[32]C-1975-69: C.K. Williams, II, and J.E. Fisher, "Corinth 1975: Forum Southwest," Hesperia 45, 1976, pp. 1--162, nr. 27, pp. 106--107, pl. 19; Koehler 1981, p. 454, fig 1:a, pl. 99:c.

[33]W. Gauer, Olympische Forschungen, 8, Die Tongefässe aus den Brunnen unterm Stadion-Nordwall und im Südost-Gebiet, Berlin, 1975, p. 124, pl. 20:4 (Pls. 20 and 21 illustrate Corinthian A, A' and B jars of various periods). Small versions: Pease 1937 (note 14 above), no. 201, p. 303, fig. 35; Boulter 1953 (note 25 above), nr. 107, p. 93, pl. 34 (cf. nrs. 164, 166, pp. 107--108, pl. 40).

[34]C-1972-118: C.K. Williams and J.E. Fisher, "Corinth 1972: The Forum Area," Hesperia 42, 1973, nr. 27, p. 25, pl. 11. See also ibid., nr. 28, p. 25, pl. 11 (toe missing); Koehler 1982, nr. 17, pp. 291--292, pl. 79.

[35]P 6395: Grace 1979, fig. 42, left. See also Koehler 1982, nrs. 18, 19, p. 292, pl. 79.

[36]Vandiver and Koehler 1986, pp. 195, 199, fig. 30.

[37]Koehler 1982, nr. 1, p. 290, pl. 79; later example, SS 10048 in Koehler 1978, fig. 3:e (note stamp; profile, retouched for publication, shown in V.R. Grace, Small Objects from the Pnyx, II, Hesperia Suppl. 10, Princeton 1956, p. 167, pl. 74, lower left).

[38]P. Orlandini, "Deposito di anfore ellenistiche in Via Polieno [Gela]," NSc 10, 1956, pp. 355--357, figs. 1, 2.

[39]Kapitän 1973 (note 22 above), fig. 2; Kapitän 1976 (note 22 above), fig. 3 and Koehler 1982, nr. 4, p. 290, pl. 79.

[40]A.J. Parker, "The evidence provided by shipwrecks for the ancient economy," Thracia Pontica III. Les Thraces et les colonies grecques, VII--V s. av. n. é, Sozopol, 6--12 Octobre 1985, Sofia, 1986, pp. 30--45, at pp. 40, 44, citing idem, "Relitto di una nave corinzia a Vulpiglia (Siracusa)," VI Congreso Internacinal de Arqueologia Submarina. Cartagena 1982, Madrid 1985, pp. 117--126; Koehler 1982, nr. 10, p. 291, pl 79; S. G. Miller, "Menon's Cistern," Hesperia 43, 1974, pp. 194--245, nr. 52, p. 236, pl. 33 (note stamp); Robinson 1969 (note 15 above), nrs. 3, 9, pp. 11--13, pl. 2; Koehler 1982, nr. 20, pl. 79 (for 21 on plate read 20) and Koehler 1978, fig. 3f.

[41]Koehler 1982, nr. 21, p. 291, pl. 79 (for 20 on plate read 21); cf. ~~Koehler 1982~~ 16:d. 1982, nrs. 14, 22, pp. 291--292, pl. 79. The Patras jar is dated by parallels from Corinth Well 1981-2 (upper

filling, to end of the first half of the 3rd century B.C., C.K. Williams, II and O.H. Zervos, "Corinth 1981: East of Theater," Hesperia 51, 1982, pp. 115--163, at 120--124).

[42]C. Vatin et al., Mèdèon ed Phocide V. Tombes Hellenistiques. Objects de Métal, Monnaies, Paris 1976, p. 22, fig. 24 (the amphora would lower the date there given to Tomb 115); B.G. Kallipolitis, Πρακτικά 17, 1960, pp. 134--135, pl. 98:a, second from right.

[43]Some illustrated examples: A-M. and A. Bon, Les timbres amphoriques de Thasos. Etudes thasiennes 4, Paris 1957, nr. 2253, p. 512; Robinson 1969 (note 15 above), nrs. 10, 11, p. 13, pl. 2); Kenchreai IV (note 16 above), nrs. Gr 84--96, pp. 33--36, pls. 9, 10; Orlandini 1956 (note 38 above); see also notes 37, 40 above. A number of stamps depict a Type B jar contemporary with the series: Koehler 1982, nrs. 1--16, pp. 284--291, pl. 78.

[44]Deipnosophistae I, 30f.

[45]Ibid., 33b.

[46]The lining from Corinthian B pieces found at Carthage has been analyzed by C.W. Beck of Vassar College and found to be pine rosin; full publication of results is forthcoming but see S.R. Wolff, "Carthage and the Mediterranean: Imported amphoras from the Punic commercial harbor," Cahiers des Etudes Anciennes 19, 1986, pp. 135--153, at p. 143, fig. 3. For amphora linings, see C.G. Koehler, "Handling of Transport Amphoras," BCH Suppl. 13 (see note 4 above), pp. 50--52.

[47]Whitbread diss., p. 331; G.R. Edwards, Corinth VII, iii, Corinthian Hellenistic Pottery, Princeton 1975, pp. 145--146.

[48]Vandiver and Koehler 1986, pp. 204--205.

[49]These were taken wet and dry using methods developed by V.R. Grace and set forth in B.L. Johnson, C.G. Koehler, P.M.W. Matheson, and M.B. Wallace, "Measuring Amphora Capacities," submitted to the Journal of Field Archaeology.

[50]For a brief history of measuring amphora capacities, see M.B. Wallace, "Progress in Measuring Amphora Capacities," BCH Suppl. 13, (see note 4 above), pp. 87--94, at pp. 87--88. Chian capacities are summarized in ibid., p. 88 with note 4; see also V.R. Grace and M. Savvatianou-Pètropoulakou, Exploration archèologique de Dèlos 27, L'Ilot de la Maison des Comèdiens, Paris 1970, p. 360, note 4. For Rhodian, see Wallace BCH Suppl. 13, pp. 89--91 and P.M.W. Matheson and M.B. Wallace, "Some Rhodian Amphora Capacities," Hesperia 51, 1982, pp. 293--320, at pp. 297--298.

Koehler, Corinthian Amphoras

Captions to Illustrations

Plate 1. Corinthian A Amphoras (Scale 1:10)
- a. Corinth C-1962-644, end of the Late Protocorinthian period. Well 1962-5. Height 0.64 m.
- b. Athenian Agora P 12795, last quarter of the 6th century. Deposit G 12:3. Height 0.41 m.
- c. Corinth C-1937-2037, about 480. Well 1937-3. Height 0.63 m.

Plate 2. Corinthian A and A' Amphoras (Scale 1:10)
- a. Corfu Archaeological Museum 7548, 4th century(?) From the sea. Height 0.72 m.
- b. Corinth C-1971-393, third quarter of the 4th century. Cistern 1971-2. Height 0.60 m.
- c. Corfu Archaeological Museum 7954, mid-3rd century. From the sea. H. 0.79 m.

Plate 3. Corinthian B Amphoras (Scale 1:10)
- a. Corinth C-1937-2042, late 6th century. Well 1937-3. Height 0.50 m.
- b. Corinth C-1975-69, 460--440. Pit 1975-1. Height 0.5i m.
- c. Corinth C-1972-118, mid-4th century. Pit 1972-1. Height 0.55 m.

Plate 4. Corinthian B Amphoras (Scale 1:10)
- a. Athenian Agora P 6395, last quarter of the 4th century. Deposit D 15:3. Height 0.68 m.
- b. Corfu Archaeological Museum 7962, second quarter of the 3rd century. From the sea. Height 0.84 m.
- c. Patras Archaeological Museum, uninventoried (CK 15), mid-3rd century. From the sea. Height 0.70 m.

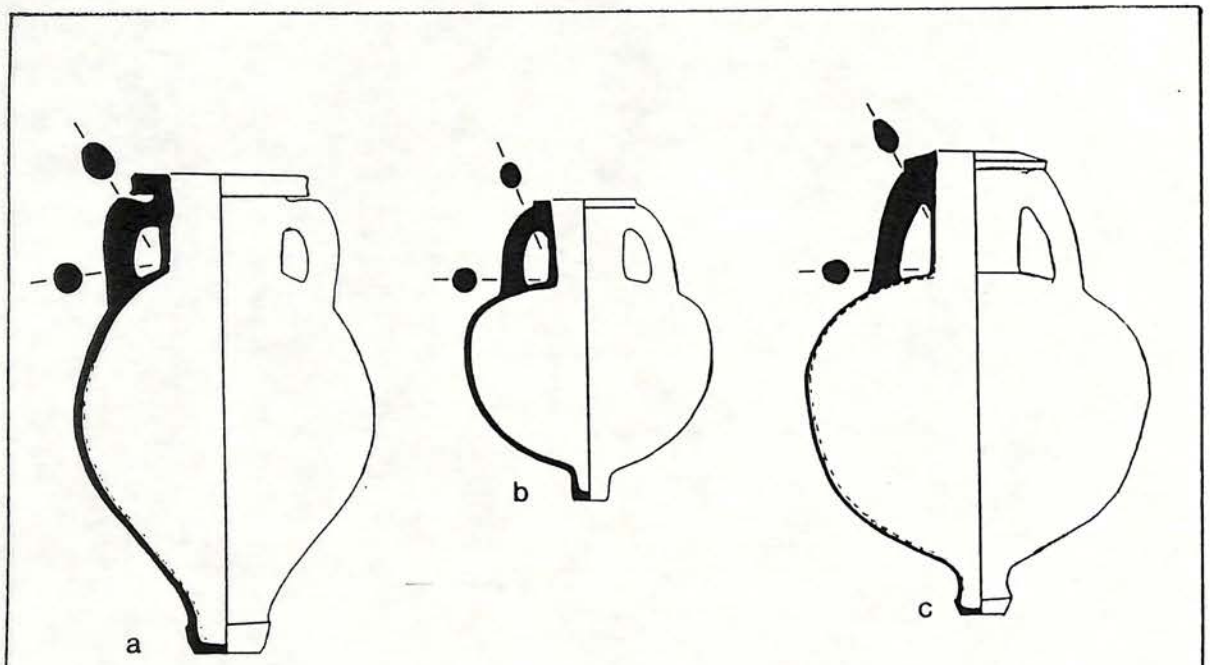

Plate 1. Corinthian A Amphoras (Scale 1:10). a) Corinth C-1962-644, end of Late Protocorinthian. Well 1962-5. H. 0.64 m. b) Athenian Agora P 12795, last quarter of the 6th c. Deposit G 12:3. H. 0.41 m. c) Corinth C-1937-2037, ca. 480. Well 1937-3. H. 0.63 m.

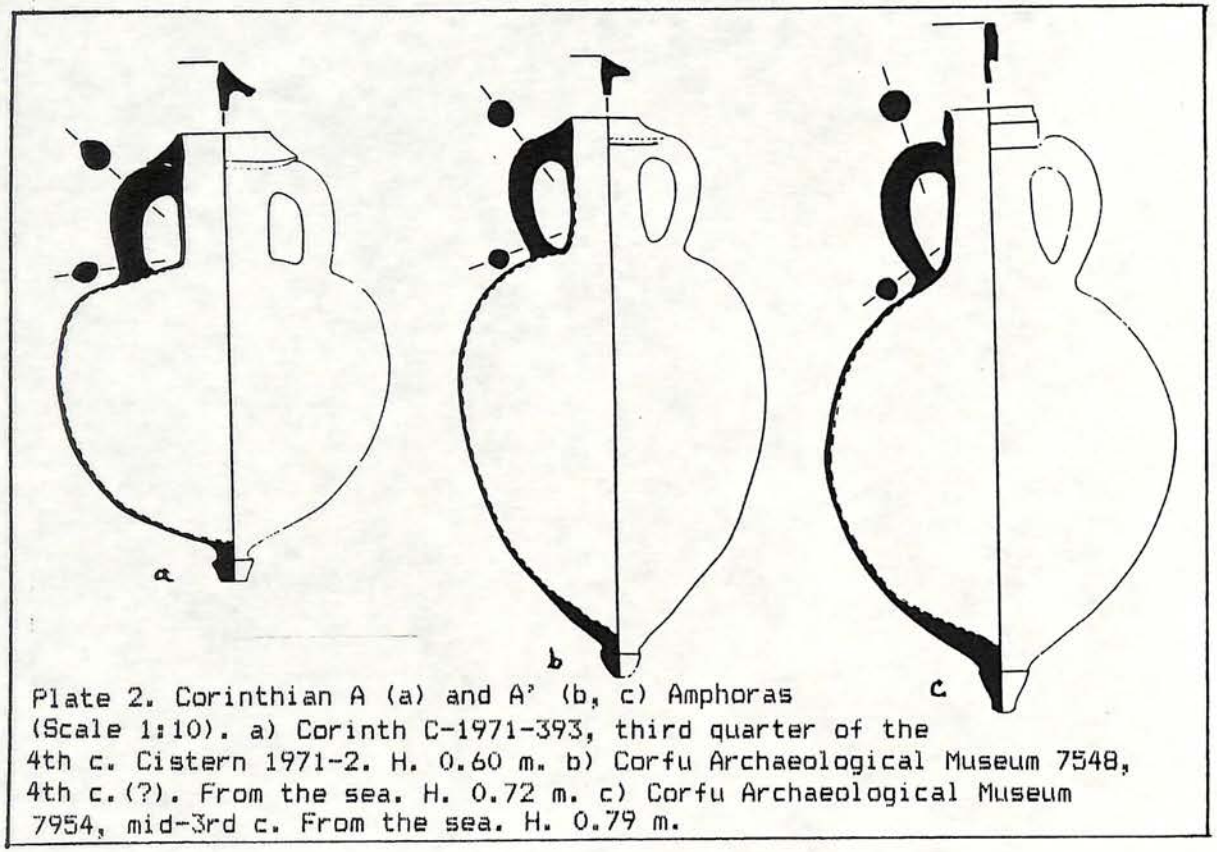

Plate 2. Corinthian A (a) and A' (b, c) Amphoras (Scale 1:10). a) Corinth C-1971-393, third quarter of the 4th c. Cistern 1971-2. H. 0.60 m. b) Corfu Archaeological Museum 7548, 4th c.(?). From the sea. H. 0.72 m. c) Corfu Archaeological Museum 7954, mid-3rd c. From the sea. H. 0.79 m.

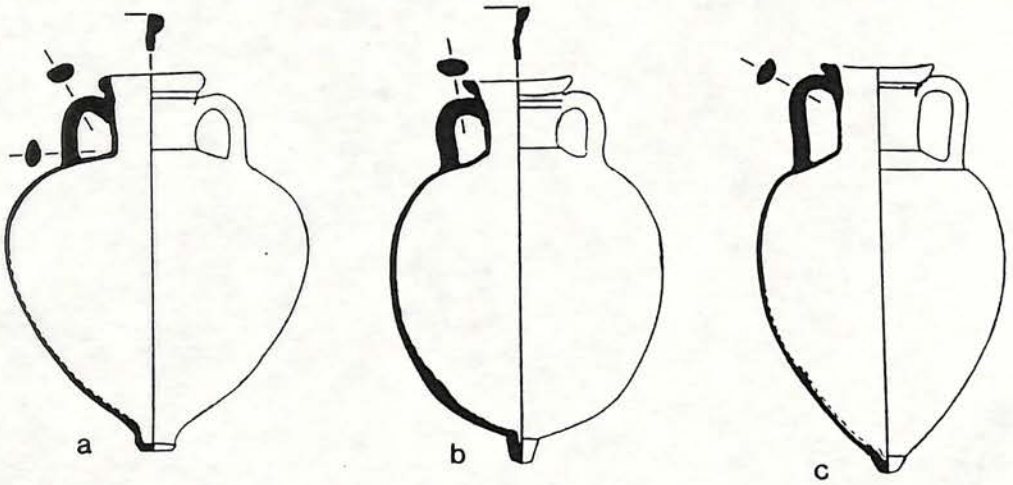

Plate 3. Corinthian B Amphoras (Scale 1:10). a) Corinth C-1937-2042, late 6th c. Well 1937-3. H. 0.50 m. b) Corinth C-1975-69, 460--440. Pit 1975-1. H. 0.51 m. c) Corinth C-1972-118, mid-4th c. Pit 1972-1. H. 0.55 m.

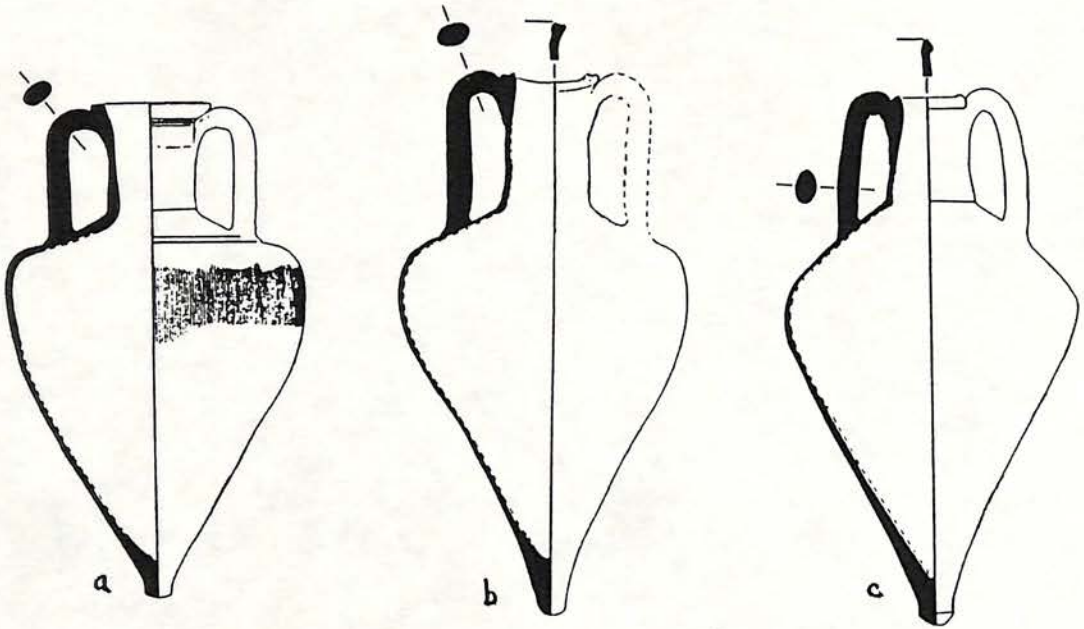

Plate 4. Corinthian B Amphoras (Scale 1:10) a) Athenian Agora P 6395, last quarter of the 4th c. Deposit D 15:3. H. 0.68 m. b) Corfu Archaeological Museum 7962, second quarter of the 3rd c. From the sea. H. 0.84 m. c) Patras Archaeological Museum, uninventoried (CK15), mid-3rd c. From the sea. H. 0.70 m.

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A Brief Typology and Chronology of Corinthian Transport Amphoras

Abstract

Ancient Corinth is thought to have produced three series of transport amphoras in the Greek period. Corinthian Types A and A', which are related in shape, in method of manufacture, and sometimes in fabric, have been securely attributed to Corinth. Type A was produced from the end of the 8th through the 4th century B.C. It is easily recognized by its red and gray clay with many large inclusions, its spherical body and projecting rim. Type A', which began by the early 5th century and continued at least into the 2nd century B.C., can be distinguished by its ovoid body and, after the mid-fifth century, by its coarse yellow fabric. Corinthian Type B was perhaps also produced at Corinth, although the Corinthian colony of Corcyra seems to have made at least some jars in this series. Manufactured from the last quarter of the 6th into the 2nd century B.C., Corinthian B jars have a fine fabric of yellow or light reddish brown and are typical of Greek amphoras in the shape of their body and its evolution from a short, squat form to a taller, thinner one. All three types were shipped primarily westward to Sicily and Magna Graecia, although a few are found in the region of the Black Sea.

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A Brief Typology and Chronology of Corinthian Transport Amphoras

Corinth is now recognized as one of a number of Greek city-states known to have made and exported the large, coarseware jars used for the storage and transportation of commodities in bulk.[1] Corinthian amphoras are not mentioned in the ancient literature, but archaeological evidence has made possible the identification of as many as three classes that can be linked with that ancient emporium. Two of these, termed Corinthian A and A', which are related in style, in their method of manufacture, and sometimes in fabric, have been securely attributed to Corinth. There is some evidence that the third class, known as Corinthian Type B, was also produced at Corinth, although the Corinthian colony of Corcyra seems to have manufactured at least some jars in this series. Here follows a summary definition of each type and a chronological outline of their development in shape, with general indications of their distribution.

Type A

Type A amphoras grew out of the tradition at Corinth that produced large, globular storage jars in the Geometric period.[2] By the end of the 8th century B.C., the Corinthian A jar is distinguishable from other containers by its elongated, cylindrical toe and its vertical handles, which made it maneuverable. The class is also characterized visually by a roughly spherical body, a broad, flat rim, and heavy handles (Pls. 1:a-c, 2:a). Until the end of their production about 300 B.C., Corinthian A jars were largely hand-built, which seems to be exceptional for transport amphoras in the Archaic and Classical periods.[3]

Throughout its period of manufacture, the fabric of Corinthian A is strikingly uniform and can easily be recognized by its reddish color and large, angular inclusions. It is very hard, sometimes almost vitreous, with an extremely fine clay matrix containing quartz silt and chert.[4] Most often the core is gray (5YR 6/1) with outer reddish layers (2.5YR 6/6 to 7.5 YR 7/6), but the cross-section can be all red or all gray.[5] External surfaces are usually a lighter pinkish-orange (7.5YR 7/4 to 7/6). In the second half of the 4th century (and sometimes earlier), a wash of an iron-rich material was painted or wiped on the exterior and occasionally on the upper neck interior in striking swirls of deep red or dark gray.[6]

The numerous and distinctive red and gray inclusions in Corinthian A fabric, which average 1--2 mm. in size, have been identified by petrological analysis as mudstone and tuffite containing microfossils of radiolaria. Such inclusions have also been identified in roof tiles found in kilns at Corinth, as well as in terracotta sculptures and local coarsewares such as perirrhanteria and hydriai. The sources of this temper have been located in the immediate vicinity of ancient Corinth, including prominent outcrops on Acrocorinth.[7]

Corinthian A jars accompanied the numerous other exports shipped from Corinth to the west during the period of Greek expansion in the later 8th and 7th centuries B.C. In fact, the chronology of the beginning stages of shape for Type A depends chiefly upon examples excavated at coastal settlements around southeast and central Sicily and in Magna Graecia. Most of these have been recovered from cemeteries, where such containers were frequently reused as cinerary urns or as coffins for infants. Jars found with grave offerings of Protocorinthian pottery at Schirone near Metaponto and at Gela establish the Corinthian A amphora series as one of the first produced in Greece.[8]

The next stage of development is represented by a Type A jar found in a stratified well deposit of the third quarter of the 7th century (Pl. 1:a).[9] Considerable skill and care were expended in precise trimming of rim and bevelled cap toe, qualities which marked the many diverse products of the Corinthian ceramics industry which flourished at this period. Amphoras very like this one appear at Camarina on the southeastern coast of Sicily at the time of its foundation a quarter of a century later and other jars from the Archaic cemetery there indicate the evolution in shape of Type A throughout the 6th century B.C.[10]

Other finds at Corinth mark sixth-century stages in the trend toward a more sharply curving body, a narrower toe and neck, and a less massive rim.[11] By the beginning of the 5th century, these tendencies result in the slightly flattened shoulder of the small Type A amphora from a well in the Athenian Agora (Pl. 1:b).[12] Its cylindrical toe is distinct in profile from the body, and its handles are slightly pinched at the top, so that their section is no longer round but increasingly ovoid. Larger counterparts of this amphora were widely exported throughout the Greek world in the later 6th and early 5th centuries, as finds from Gela to the Elizavetovskoe settlement on the Don demonstrate.[13]

In the first quarter of the 5th century, the upper surface of the horizontal Type A rim begins to slant down (Pl. 1:c); by the mid-fifth century, the handles, now more sharply pinched at the top, are occasionally stamped at the base with a palmette.[14] The generally spherical shape of the body on Type A jars continues to the end of their manufacture at the close of the 4th century (Pl. 2:a).[15] Immediately recognizable characteristics of such jars are a peg toe (which provides a firm grip for lifting) and a heavier, overhanging rim which rests on the spiny top edge of the handles. In section the handles are triangular or teardrop-shaped at the top and round or slightly oval at the bottom. A palmette is sometimes stamped at the base of one or both handles in the second half of the 4th century; occasionally a single letter or monogram appears on the upper flat side of either handle.[16] Nearly all Corinthian A jars known of the 5th and 4th centuries have been found at Corinth.

Type A'

Corinthian Type A' (Pl. 2:b, c) was isolated as a distinct class of amphoras when numerous fragmentary examples were excavated in a fifth-century establishment at Corinth known as the Punic Amphora Building.[17] Type A' can be differentiated from Type A in the ovoid shape of its body and, particularly after the middle of the 5th century, in its fabric. It shares with Type A, however, an overall similarity of shape and in particular the broad, sloping rim; the method of construction by hand; and, before the mid-fifth century, sometimes also the same clay and/or mudstone inclusions.[18] Appearing alongside Corinthian A at least by the early 5th century B.C., Type A' continued through the 4th century and apparently replaced Type A in the 3rd and 2nd centuries B.C. It seems to have functioned largely as an export container, ending up, like Corinthian A jars in an earlier period, primarily in Sicily and Magna Graecia.

Generally speaking, Type A' jars are related in fabric to most of the common types of Corinthian ceramics; with the exception of some in the earliest decades of their production, they are made of fine yellow clay and the usual inclusions after the mid-fifth century are fine quartz sand, chert, and lime.[19] The surface of Corinthian A' jars is light pink to light yellow (ranging from 10YR 8/2 to 10YR 8/3 to 7.5YR 7/4) and exhibits no treatment beyond the final wiping or smoothing. In cross-section the color is generally pink (5YR 8/4 to 7.5YR 7/4); often there is an outer layer of the same color as the surface.

Corinthian A' jars show some evolution of form, although after the middle of the 5th century the lack of well dated excavation contexts and the profusion of variations makes it hard to establish a clear linear development.[20] In the later 5th and the 4th centuries, the slope of the overhanging rim gradually steepens, as on contemporary Type A jars. The neck narrows and the high shoulder broadens (Pl. 2:b). Handles are curved in plan and round in diameter, decreasing in size toward the bottom. Stamps on the handles are infrequent in this period, but there are a few, some similar to those found on Type A.[21]

In the beginning of the 3rd century, the production of Type A' seems to have expanded, even as that of Corinthian A ceased. Numerous fragments of such amphoras which were found (together with Type B jars) in a shipwrecked cargo at Stentinello near Syracuse and another at Savelletri near Brindisi suggest extensive Corinthian exports in the first half of the 3rd century B.C. and show further stylistic evolution.[22] The point of maximum diameter on the ovoid body of Corinthian A' has dropped to the center; the cap toe is conical. Gradually the slant of the rim steepens and acquires a bevel at about its midpoint. The latest pieces from the Savelletri cargo, which are similar to a jar from Corfu (Pl. 2:c), demonstrate that by the middle of the 3rd century the collarlike rim is nearly vertical, the neck flared toward the bottom, and the toe enlarged, with compound curve in profile. Stamps occur rarely and include three names.[23]

Type B

Corinthian Type B amphoras are marked by a more or less ovoid body, a flaring rim, and vertical, arched handles (Pls. 3, 4). These jars were manufactured from about 525 to at least the late 3rd century and probably into the 2nd century B.C. Type B jars were exported primarily to the west, and are found at many sites where Type A and A' jars have been recovered.

Corinthian B fabric is generally light in color and fine in texture. Petrological analysis has shown that throughout their production Type B jars were made predominantly of the yellow clay that characterizes most Corinthian ceramics; surface and interior are usually light pink to light brownish yellow (5YR 8/4 to 7.5YR 7/4). After the third quarter of the 4th century, however, some appear instead in a fabric that is similar to the first but light reddish-brown in color (2.5YR 6/6). Inclusions are mostly small ones of quartz and chert, with no mudstone or tuffite; small voids or pores are often noticeable in cross-section.[24] The surface of jars made from yellow clay is finished simply by wiping or smoothing, but the reddish-brown jars of the first half of the 3rd century are usually covered with a pale buff slip.

Originally the Type B series was tentatively assigned by Virginia Grace to the Corinthian colony of Corcyra.[25] An ancient source that has come down to us as part of the Aristotelian corpus describes a centralized market in northern Greece to which merchants come from the Pontus with Lesbian, Chian, and Thasian goods, and others from the Adriatic with Corcyraean amphoras.[26] The relatively small number of Corinthian B jars and stamped handles found on Corfu and in the waters around it were candidates for the class to which he referred, since very few amphoras of any other type had been excavated on the island. Nevertheless, although Κερκυραικοὺς ἀμφορεῖς indicates that the type was associated with Corcyra, it does not exclude that the jars so named could have been manufactured elsewhere as well. Other evidence links the Type B series to Corinth, where increasing numbers of them have been excavated in the past two decades. Type B jars found at Corinth document the whole range of development of the series and, at 416 inventoried pieces, outnumber any other contemporary amphora type found at Corinth (including even the Corinthian A and A' series, of which the inventoried examples at Corinth together total 324). Analysis by neutron activation has in fact matched the fabric of Type B jars with that of other Corinthian pottery.[27]

More recent analyses using optical emission and Mössbauer spectroscopy have separated Type B jars into two fabric groups on the basis of (respectively) chemical composition and the nature of the iron in the clay. Those results linked some of the test group of amphoras with the control group of coarsewares from Corinth, as had the neutron activation study, but they also matched other Type B jars with coarse pottery made on Corfu. The two techniques did not assign individual jars to the same group

in every case, but the general conclusion was clear: at least some Corinthian B jars were made in Corcyra from the Archaic period through the early 3rd century, at the same time that they were being produced in Corinth.[28]

The two groups of Type B amphoras established by physico-chemical analyses can not be distinguished either stylistically or petrologically; further evidence is needed for a complete explanation of the manufacture of the Corinthian B series.[29] Very recent excavations in a potters' quarter on Corfu offer direct evidence for the attribution of at least some Corinthian Type B jars. A large area with several kilns has revealed quantities of fragments and kiln wasters of Type B amphoras which date from the second half of the 5th to the mid-third centuries B.C.[30] This does not rule out the possibility that Type B jars were also made at Corinth. In any case, the many examples from shipwrecks and other sites show that Corinthian A, A' and B jars were often shipped together; the network of distribution, at the least, seems linked to Corinth. Until the relationship of Corinth and its colony of Corcyra in the matter of production and export of these containers can be more fully explained, it seems best to retain the current nomenclature for the series.

Amphoras of the Corinthian B series exhibit a quite regular evolution of profile. Numerous jars and fragments dated by context at both Corinth and Athens attest the shape of the earliest Type B jars, which belong to the last quarter of the 6th century B.C. (Pl. 3:a).[31] Already several characteristics of the class are clearly defined: the rounded, outward-thickened rim, the ridge or offset band around the top of the neck, and the arching, vertical handles. About 480 B.C., the cylindrical toe becomes smaller and the rim flared; by the middle of the 5th century the body is ovoid and the toe a conical cap (Pl. 3:b).[32] Such jars were exported to many sites in Greece and also in the west.[33]

From this point on, the body of Corinthian B amphoras gradually lengthens and narrows, following a tendency general for most transport amphoras throughout the Greek period. From the beginning of the 4th century, the toe is formed together with the body and continues its line, although initially it is articulated by a deep groove (Pl. 3:c).[34] By the end of the 4th century, neck and handles are taller, and the elongation of the body is even more pronounced (Pl. 4:a).[35] Often a wide band of shallow grooves accentuates the broad, high shoulder, possibly the impression made by a girdle of sticks as the vessel dried.[36] The upper neck, still with a ridge or groove (or two) around its top, is oval and the flaring rim is pinched where it rises over the handles, so that in plan view it often resembles a figure-eight.[37]

The still more exaggeratedly piriform body of the jar in Pl. 4:b can probably be dated toward the end of the first quarter of the 3rd century B.C., since it seems to be a slightly later stylistic stage than the 18 Type B jars from a deposit buried in

the destruction of Gela in 280 B.C.[38] Its shoulder slopes somewhat more, and the rim, although still flared, is more compact and has an almost triangular section. The latest of the Corinthian B necks from the Stentinello wreck are approximately contemporary with the important group at Gela; somewhat later still and datable to the second quarter of the 3rd century are the pieces from the shipwreck at Savelletri.[39] These and other groups in the west show that the period of greatest export of Corinthian B amphoras was in the latter part of the 4th and first half of the 3rd century B.C.[40] On the Corinthian B jar tops from Savelletri, the rim shortens to a roll, above which the heavy handles arch, and the toe develops a slight bulge at its tip. At about the middle of the 3rd century, the point of maximum diameter drops well below the shoulder, as illustrated by the biconical body on an intact find in Patras from the sea (Pl. 4:c).[41]

Not much later there is a major, perhaps abrupt, change in Corinthian B jars: The shoulder becomes less angular and the neck smaller in proportion to the whole body, with a small rim that is semi-circular in section. Most strikingly, the handles now lose their arch and attach below the rim.[42] Examples of this latest stage in the development of Type B have appeared recently in excavations at Corinth but cannot be dated more closely than the mid-third to second century B.C.; presumably their production ceased when the Romans under Mummius sacked the city in 146.

Stamps appear on some Corinthian B jars primarily after the middle of the 4th century, impressed either on the top of the curve of the handle or at its lower attachment. More jars seem to have been stamped in the late 4th and early 3rd centuries; for instance, 8 of 18 Type B amphoras in the deposit at Gela bear stamps. Some 400 different dies are known. Generally, single letters, ligatures, or simple monograms were impressed on the top of a handle or at its base, but small pictorial devices were also popular.[43] These are likely to be potter's marks, but their significance remains uncertain. Dipinti, nearly always in red and showing one to three letters, a ligature, or a monogram, occur with some regularity.

There is little mention of commodities that might have been carried in the jars of these three series; wine and oil are the most obvious candidates. The reputation of Corinthian wine suggests that it would have been exported strictly as <u>vin ordinaire</u>: Athenaeus quotes Alexis, a poet of Middle Comedy, as despising Corinthian wine as hard (σκληρός)--torturously bad, in fact: οἶνος ξενικὸς παρῆν· τὰ γὰρ Κορίνθια βασανιστός ἐστι.[44] (Corcyraean wine, on the other hand, is mentioned in the <u>Deipnosophistae</u> as taking aging very well: χαριέστατος δ' οἶνος εἰς παλαίωσιν ὁ Κερκυραῖος.[45])

Analyses using gas chromatography have not to date identified organic material representing the original contents of A, A' or B amphoras. A very tentative hypothesis or two may be

suggested, however. It is possible that Corinthian B carried wine, since Type B jars were coated on the interior with a resinous substance which kept the liquid from soaking into the porous fabric of the container, a practice known to have been used for jars that carried wine or semi-liquid contents (but not oil).[46] In turn, the fabric of Type A jars can be associated with that of oil-carrying lekythoi, lamps, and other vessels of the 5th and 4th centuries made at Corinth of blisterware, a clay related to that of Type A.[47] Certainly the hardness of blisterware vessels and of Corinthian A jars was well adapted to withstand erosion caused by oil, and their impermeable walls would not have required any lining.[48] Type A' jars, on the other hand, were permeable and would have had to be coated with resin, beeswax or some other substance that would not have spoiled the contents. No trace of a lining on Corinthian A' amphoras is known.

Direct measurements of capacity have been taken for together nearly 200 jars of the three Corinthian types.[49] For some amphora classes in some periods a size or series of sizes can be recovered, but sizes have not been recovered for Corinthian A and A'.[50] Type A jars are on the whole much larger than those of other Greek amphora series; in all periods they held various amounts, the smallest about 18 liters, the largest 70, and the majority above 40. Type A' jars range in size from roughly 18 to 50 liters. With Corinthian B amphoras, however, the results have been more promising. Their span for the entire period of production is 19.3 to 27.6 liters, with some jars of a much smaller size, but for the early 3rd century Corinthian B jars seem to have achieved a certain intended size. Ten jars at Gela from the deposit in the Via Polieno (see above) which were measured with water held a mean of 25.0 liters +/- one standard deviation of 0.995 liter. Further measurements of chronological groups of intact Corinthian A, A' and B amphoras, when these are available, will determine whether there were "normal" sizes for Type A and A' jars as well, and for Type B jars in other periods.

Corinthian amphoras furnish important evidence about the economics and trade not only of Corinth but of the wider Greek world as well. I.B. Brashinskii and I.B. Zeest have shown that they formed at least some part of exports to the Black Sea and other areas to the northeast of the Greek mainland. Corinthian jas have not been identified hitherto in any great amount in these regions, but it is hoped that this survey will help to bring about an assessment of their role in such trade.

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Notes

[1]I thank the Texas Antiquities Commission for permission to reprint as Pls. 1--4 here Figs. 1 and 2 from C.G. Koehler, "Evidence around the Mediterranean for Corinthian Export of Wine and Oil," in J. Barto Arnold, III, ed., Beneath the Waters of Time: The Proceedings of the Ninth Conference on Underwater Archaeology, Texas Antiquities Committee Publication 6, Austin 1978, pp. 231--239 (referred to below as Koehler 1978). I am very grateful to M.B. Wallace for useful comments on earlier versions of this paper.

The results of the author's study of Corinthian amphoras first appeared as Corinthian A and B Transport Amphoras, Ph.D. dissertation, Princeton University 1978. In updated form the full work will soon appear as Corinthian Transport Amphoras. The following, with the short references used when they appear in this article, are interim publications on various aspects of the topic: "Corinthian Developments in the Study of Trade in the Fifth Century," Hesperia 50, 1981, pp. 449--458 (Koehler 1981); "Amphoras on Amphoras," Hesperia 51, 1982, pp. 284--292 (Koehler 1982); P.B. Vandiver and C.G. Koehler, "Structure, Processing, Properties and Style of Corinthian Transport Amphoras," in W.D. Kingery, ed., Technology and Style, Ceramics and Civilization 2, Columbus, Ohio 1986, pp. 173--215 (Vandiver and Koehler 1986); I.K. Whitbread, The Application of Ceramic Petrology to the Study of Ancient Greek Transport Amphorae, with Special Reference to Corinthian Amphora Production, Ph.D. Dissertation, University of Southampton 1986 (Whitbread diss.).

[2]C. Pfaff, "A Geometric Well at Corinth: Well 1981-6," Hesperia 57, 1988, pp. 21--80, at 29--31, traces the development of the coarseware storage amphora in the Geometric period at Corinth. See also Koehler 1981, p. 451, pl. 98:a (where for C-1962-162 read C-1972-162).

[3]Corinthian A bodies and rims were always shaped by hand (as Geometric pots had been), and so also the necks until the second half of the 4th century, when they began to be thrown on the wheel (Vandiver and Koehler 1986, pp. 182, 187).

[4]Whitbread diss., pp. 339--343. For a brief summary of the petrological analyses of Corinthian amphoras, see I.K. Whitbread, "The Characterisation of Argillaceous Inclusions in Ceramic Thin Sections," Archaeometry 28, 1986, pp. 79--88, at pp. 84--86; idem, "The Application of Ceramic Petrology to the Study of Ancient Greek Amphorae," in Empereur, J.-Y. and Garlan, Y., eds., BCH Suppl. 13, Recherches sur les Amphores Grecques, Paris 1986, pp. 95--101, at pp. 97--100.

[5]Alphanumerical descriptions in parentheses are taken from the Munsell Soil Color Charts, Baltimore 1975.

[6]Semiquantitative surface analysis using non-destructive x-ray fluorescence spectrometry, undertaken in 1976 by R.E. Jones of the Fitch Laboratory, British School at Athens.

[7]Whitbread diss., pp. 339--343, analysis of Type A; pp. 363--378, other Corinthian ceramics. Location of temper, M. Farnsworth, "Corinthian pottery: Technical Studies," AJA 74, 1970, pp. 9--20, at pp. 9--11; Whitbread diss., pp. 389--391.

[8]Koehler 1981, p. 451, pl. 98:b; D. Adamesteanu, La Basilicata Antica: Storia et monumenti, [Cava dei Tirreni], Di Mauro 1974, p. 112 and photograph p. 113, left, of an amphora from the necropolis at Schirone (Policoro); idem, "Predio La Paglia [Gela]. Nuovi ritrovamenti nella necropoli archaica," NSc 10, 1956, pp. 281--288, at pp. 285--286, fig. 6 and Koehler 1978, fig. 3a. There are numerous other exports of Corinthian jars, but here and in the notes that follow only a few representative examples with published illustrations can be cited.

[9]C-1962-644: D.A. Amyx and P. Lawrence, Corinth, VII, ii, Archaic Corinthian Pottery and the Anaploga Well, Princeton, 1975, nr. An 306, pp. 157--158, pls. 79, 110 and Koehler 1981, p. 451, pl. 98:c; cf. An 288, 290, and 304, on pp. 154, 155, 157, pls. 80, 81, 110. For a contemporary vessel of large size, see P. Orlandini, "Villa Garibaldi, Nuovi ritrovamenti nella necropoli arcaica," NSc 10, 1956, pp. ~~291~~ 289--316, at pp. 291--293, fig. 5:a.

[10]Thanks go to P. Pelagatti, then Superintendent of Antiquities for Eastern Sicily, for making it possible for me to examine jars at Camarina in 1974 and 1979 and to mention them.

[11]Jar of the 580's or 570's, C.K. Williams, II, "Corinth 1977, Forum Southwest," Hesperia 47, 1978, pp. 1--39, nr. 1, pp. 5, 8, 34, pl. 1 and Koehler 1981, p. 452, pl. 98:d; jar of the second quarter of the 6th century, E. Brann, "A well of the 'Corinthian' period found in Corinth," Hesperia 25, 1956, nr. 59, pp. 365--366, pl. 58 and Koehler 1981, p. 452, pl. 98:e.

[12]P 12795: V.R. Grace, Amphoras and the Ancient Wine Trade, rev. ed., Agora Picture Book 6, 1979, fig. 35, left; Koehler 1981, p. 452, pl. 98:f.

[13]D. Adamesteanu, "Scoperta di tombe greche in Via Francesco Crispi," NSc 14, 1960, pp. 137--151, at p. 141, fig. 6:b; Tomb 4 contained a miniature Corinthian skyphos dated to the early 6th century (ibid., fig. 7:b, p. 137) which could, according to D.A. Amyx, belong to the second half of the 6th century as well (personal communication). Exports to Elizavetovskoe: I.B. Brashinskii, "New materials toward the study of economic relations of Olbia in the sixth to fourth centuries B.C.," Archeologia 19, 1968, pp. 45--59, at pp. 45--48; idem, "New evidence of Greek imports in the Lower Don, according to materials found in the Elizavetoskoe townsite and cemetery," Brief Communications of the Institute of Archaeology of the

Academy of Sciences of the U.S.S.R 124, 1970, pp. 12, 16--18; I.B. Zeest, Pottery Containers of the Bosporos, Moscow 1960, p. 71, fig. 1:5.

[14]C-1937-2037: M.T. Campbell, "A Well of the Black-Figure Period at Corinth," Hesperia 7, 1938, pp. 557--611, nr. 201, pp. 605--606, fig. 27; Koehler 1981, p. 454, pl. 98:g. For a jar of the mid-fifth century, see M.Z. Pease, "A Well of the Late Fifth Century at Corinth," Hesperia 6, 1937, pp. 257--316, no. 200, p. 303, fig. 34; Koehler 1981, p. 454, fig. 1:d, pl. 98:h.

[15]Other jars of the second half of the 4th century: S.S. Weinberg, "A Cross-Section of Corinthian Antiquities (Excavations of 1940)," Hesperia 17, 1948, pp. 190--241, nr. E 13, p. 233, pl. 85; H.S. Robinson, "A Sanctuary and Cemetery in Western Corinth," Hesperia 38, 1969, nr. 2, p. 9, pl. 2.

[16]Fourth-century Type A stamps are illustrated, e.g., in B. Adamshek, Kenchreai: Eastern Port of Corinth, 4, The Pottery, Leiden 1979, nr. Gr 82, p. 32, pl. 9 (monogram) and C.K. Williams, II, "Corinth 1978: Forum Southwest," Hesperia 48, 1979, pp. 105--144, nrs. 60--62, pp. 135--136, pl. 51 (palmettes).

[17]Koehler 1981, pp. 454--458, fig. 1:c, pl. 99:g.

[18]Whitbread diss., pp. 343--347, 355--356, 375. A further bit of evidence linking the two series is the stamp on the handle of a mid-fifth-century Corinthian A jar which illustrates the contemporary A' amphora (Koehler 1981, p. 457, pl. 99:i).

[19]Ibid.

[20]Early A' jar, Campbell 1938 (note 14 above), nr. 203, pp. 605--606, fig. 27. A' jars of the mid-fifth century: Pease 1937 (note 14 above), nr. 199, p. 303, fig. 34 and Koehler 1981, pp. 454--455, fig. 1:b, pl. 99:h (where for Metaponto read C-34-932); F.G. Lo Porto, "Metaponto: Scavi e ricerche archeologice: 5. La Necropoli," NSc 20, 1966, pp 186--231, at p. 210 and fig. 61:2 on p. 207 (fig. 61:1 shows a Type A jar of the late 6th/early 5th century); I.B. Brashinskii, Greek Imports in the Lower Don in the V--III Centuries B.C., Leningrad 1980, pl. XXII:10; see also note 17 above.

[21]For published impressions of an astragal on Type A, see M-T. Lenger, "Timbres amphoriques trouvés á Argos," BCH 79, 1955, pp. 484--508, nr. 81, pp. 503--4; on A', Kenchreai IV (note 16 above), nr. Gr 83, p. 33, pl. 9. Palmettes and a monogram that may be read AOP or OPA are also known on both Corinthian A and A' jars (cf. nbte 16 above).

[22]G. Kapitän, "Il Relitto Corinzio de Stentinello nella Baia de S. Panagia (Siracusa)," Sicilia Archeologica 9, 1976, pp. 87--103, at 90--91, figs. 4, 5; cf. Koehler 1978, fig. 3:d. G. Kapitän, "A Corinthian Shipwreck at Savelletri (Brindisi,

Apulia, Italy)," International Journal of Nautical Archaeology 2, 1973, pp. 185--186, fig. 1; cf. Brashinskii 1980 (note 20 above), pl. XXII:7, 8.

[23]Απελλέα is the only name appearing more than once; it occurs on 11 handles, one published: J.G. Milne, Greek Inscriptions, Catalogue gènèral des Antiquitès Egyptiennes du Musèe du Caire, vol 18, Oxford 1905, nr. 26112, p. 124.

[24]Whitbread diss., pp. 347--356; I.K. Whitbread, BCH Suppl. 13, pp. 97--99.

[25]V.R. Grace apud C. Boulter, "Pottery of the mid-fifth century from a well in the Athenian Agora," Hesperia 22, 1953, pp. 59--115, at pp. 108--109, s.v. nr. 166.

[26]De Mirabilibus Auscultationibus 104, p. 839b,8. It is thought not to be the work of Aristotle, but "to have emanated from the Peripatetic School" (Aristotle, Minor Works, W.S. Hett, transl., The Loeb Classical Library, Cambridge, 1963, p. 233).

[27]M. Farnsworth, I. Perlman, and F. Asaro, "Corinth and Corfu: A Neutron Activation Study of their Pottery," AJA 81, 1977, pp. 455--468. This study resulted primarily in the assignment to Corinth of painted pottery found on Aegina and considered by some to be local. Coarseware samples were also analyzed, although at that point (the early 1960's) the extent of the problem of attributing Type B amphoras had not been defined. These neutron activation data can be reliably applied to this question, however, since control and test groups sampled on Corfu and at the Athenian Agora for those analyses were examined by the present author, re-sampled where possible, and re-tested by spectroscopic methods for comparison (cf. note 28 below).

[28]R.E. Jones, Greek and Cypriot Pottery: A Review of Scientific Studies, Fitch Laboratory Occasional Paper 1, The British School at Athens 1986, pp. 115--121, 176--189, and especially 712--720, with 739.

[29]Whitbread diss., pp. 358, 405.

[30]K. Preka, "Εργαστήριο κεραμεικής στο Φιγαρέτο Κερκύρας," abstract for the paper read at the conference, "Les ateliers du potier dans le monde grec aux èpoques gèomètriques, archaïques et classiques" held in Athens, October, 1987; publication of the same title, F. Blondè and J. Perrault, eds., forthcoming, 1990. I thank J. Perrault for the reference. Analyses of some of this material are planned for the near future.

[31]C-1937-2042: Koehler 1981, pp. 452--454, pl. 99:a; Campbell 1938 (note 14 above), nr. 192, pp. 604--605, fig. 27. Cf. ibid., nr. 193, pp. 604--605, fig. 27; Grace 1979 (note 13 above), fig. 35, bright jar in left foreground and S.R. Roberts,

"The Stoa Gutter Well: A Late Archaic Deposit in the Athenian Agora," Hesperia 55, 1986, pp. 1--72, nr. 415, p. 65, fig. 41, pl. 18. Early fifth-century examples, ibid., nrs. 416, 417, pp. 65--66, fig. 41, pl. 18; Koehler 1981, pp. 452--454, pl. 99:b.

[32]C-1975-69: C.K. Williams, II, and J.E. Fisher, "Corinth 1975: Forum Southwest," Hesperia 45, 1976, pp. 1--162, nr. 27, pp. 106--107, pl. 19; Koehler 1981, p. 454, fig 1:a, pl. 99:c.

[33]W. Gauer, Olympische Forschungen, 8, Die Tongefässe aus den Brunnen unterm Stadion-Nordwall und im Südost-Gebiet, Berlin, 1975, p. 124, pl. 20:4 (Pls. 20 and 21 illustrate Corinthian A, A' and B jars of various periods). Small versions: Pease 1937 (note 14 above), no. 201, p. 303, fig. 35; Boulter 1953 (note 25 above), nr. 107, p. 93, pl. 34 (cf. nrs. 164, 166, pp. 107--108, pl. 40).

[34]C-1972-118: C.K. Williams and J.E. Fisher, "Corinth 1972: The Forum Area," Hesperia 42, 1973, nr. 27, p. 25, pl. 11. See also ibid., nr. 28, p. 25, pl. 11 (toe missing); Koehler 1982, nr. 17, pp. 291--292, pl. 79.

[35]P 6395: Grace 1979, fig. 42, left. See also Koehler 1982, nrs. 18, 19, p. 292, pl. 79.

[36]Vandiver and Koehler 1986, pp. 195, 199, fig. 30.

[37]Koehler 1982, nr. 1, p. 290, pl. 79; later example, SS 10048 in Koehler 1978, fig. 3:e (note stamp; profile, retouched for publication, shown in V.R. Grace, Small Objects from the Pnyx, II, Hesperia Suppl. 10, Princeton 1956, p. 167, pl. 74, lower left).

[38]P. Orlandini, "Deposito di anfore ellenistiche in Via Polieno [Gela]," NSc 10, 1956, pp. 355--357, figs. 1, 2.

[39]Kapitän 1973 (note 22 above), fig. 2; Kapitän 1976 (note 22 above), fig. 3 and Koehler 1982, nr. 4, p. 290, pl. 79.

[40]A.J. Parker, "The evidence provided by shipwrecks for the ancient economy," Thracia Pontica III. Les Thraces et les colonies grecques, VII--V s. av. n. è, Sozopol, 6--12 Octobre 1985, Sofia, 1986, pp. 30--45, at pp. 40, 44, citing idem, "Relitto di una nave corinzia a Vulpiglia (Siracusa)," VI Congreso Internacinal de Arqueologia Submarina, Cartagena 1982, Madrid 1985, pp. 117--126; Koehler 1982, nr. 10, p. 291, pl 79; S. G. Miller, "Menon's Cistern," Hesperia 43, 1974, pp. 194--245, nr. 52, p. 236, pl. 33 (note stamp); Robinson 1969 (note 15 above), nrs. 3, 9, pp. 11--13, pl. 2; Koehler 1982, nr. 20, pl. 79 (for 21 on plate read 20) and Koehler 1978, fig. 3f.

[41]Koehler 1982, nr. 21, p. 291, pl. 79 (for 20 on plate read 21); cf. ~~Koehler 1982~~ ib. d., nrs. 14, 22, pp. 291--292, pl. 79. The Patras jar is dated by parallels from Corinth Well 1981-2 (upper

filling, to end of the first half of the 3rd century B.C., C.K. Williams, II and O.H. Zervos, "Corinth 1981: East of Theater," Hesperia 51, 1982, pp. 115--163, at 120--124).

[42]C. Vatin et al., Mèdèon ed Phocide V. Tombes Hellenistiques. Objects de Mètal. Monnaies, Paris 1976, p. 22, fig. 24 (the amphora would lower the date there given to Tomb 115); B.G. Kallipolitis, Πρακτικά 17, 1960, pp. 134--135, pl. 98:a, second from right.

[43]Some illustrated examples: A-M. and A. Bon, Les timbres amphoriques de Thasos. Etudes thasiennes 4, Paris 1957, nr. 2253, p. 512; Robinson 1969 (note 15 above), nrs. 10, 11, p. 13, pl. 2); Kenchreai IV (note 16 above), nrs. Gr 84--96, pp. 33--36, pls. 9, 10; Orlandini 1956 (note 38 above); see also notes 37, 40 above. A number of stamps depict a Type B jar contemporary with the series: Koehler 1982, nrs. 1--16, pp. 284--291, pl. 78.

[44]Deipnosophistae I, 30f.

[45]Ibid., 33b.

[46]The lining from Corinthian B pieces found at Carthage has been analyzed by C.W. Beck of Vassar College and found to be pine rosin; full publication of results is forthcoming but see S.R. Wolff, "Carthage and the Mediterranean: Imported amphoras from the Punic commercial harbor," Cahiers des Etudes Anciennes 19, 1986, pp. 135--153, at p. 143, fig. 3. For amphora linings, see C.G. Koehler, "Handling of Transport Amphoras," BCH Suppl. 13 (see note 4 above), pp. 50--52.

[47]Whitbread diss., p. 331; G.R. Edwards, Corinth VII, iii, Corinthian Hellenistic Pottery, Princeton 1975, pp. 145--146.

[48]Vandiver and Koehler 1986, pp. 204--205.

[49]These were taken wet and dry using methods developed by V.R. Grace and set forth in B.L. Johnson, C.G. Koehler, P.M.W. Matheson, and M.B. Wallace, "Measuring Amphora Capacities," submitted to the Journal of Field Archaeology.

[50]For a brief history of measuring amphora capacities, see M.B. Wallace, "Progress in Measuring Amphora Capacities," BCH Suppl. 13, (see note 4 above), pp. 87--94, at pp. 87--88. Chian capacities are summarized in ibid., p. 88 with note 4; see also V.R. Grace and M. Savvatianou-Pètropoulakou, Exploration archèologique de Dèlos 27, L'Ilot de la Maison des Comèdiens, Paris 1970, p. 360, note 4. For Rhodian, see Wallace BCH Suppl. 13, pp. 89--91 and P.M.W. Matheson and M.B. Wallace, "Some Rhodian Amphora Capacities," Hesperia 51, 1982, pp. 293--320, at pp. 297--298.

Captions to Illustrations

Plate 1. Corinthian A Amphoras (Scale 1:10)

a. Corinth C-1962-644, end of the Late Protocorinthian period. Well 1962-5. Height 0.64 m.

b. Athenian Agora P 12795, last quarter of the 6th century. Deposit G 12:3. Height 0.41 m.

c. Corinth C-1937-2037, about 480. Well 1937-3. Height 0.63 m.

Plate 2. Corinthian A and A' Amphoras (Scale 1:10)

a. Corfu Archaeological Museum 7548, 4th century(?) From the sea. Height 0.72 m.

b. Corinth C-1971-393, third quarter of the 4th century. Cistern 1971-2. Height 0.60 m.

c. Corfu Archaeological Museum 7954, mid-3rd century. From the sea. H. 0.79 m.

Plate 3. Corinthian B Amphoras (Scale 1:10)

a. Corinth C-1937-2042, late 6th century. Well 1937-3. Height 0.50 m.

b. Corinth C-1975-69, 460--440. Pit 1975-1. Height 0.51 m.

c. Corinth C-1972-118, mid-4th century. Pit 1972-1. Height 0.55 m.

Plate 4. Corinthian B Amphoras (Scale 1:10)

a. Athenian Agora P 6395, last quarter of the 4th century. Deposit D 15:3. Height 0.68 m.

b. Corfu Archaeological Museum 7962, second quarter of the 3rd century. From the sea. Height 0.84 m.

c. Patras Archaeological Museum, uninventoried (CK 15), mid-3rd century. From the sea. Height 0.70 m.

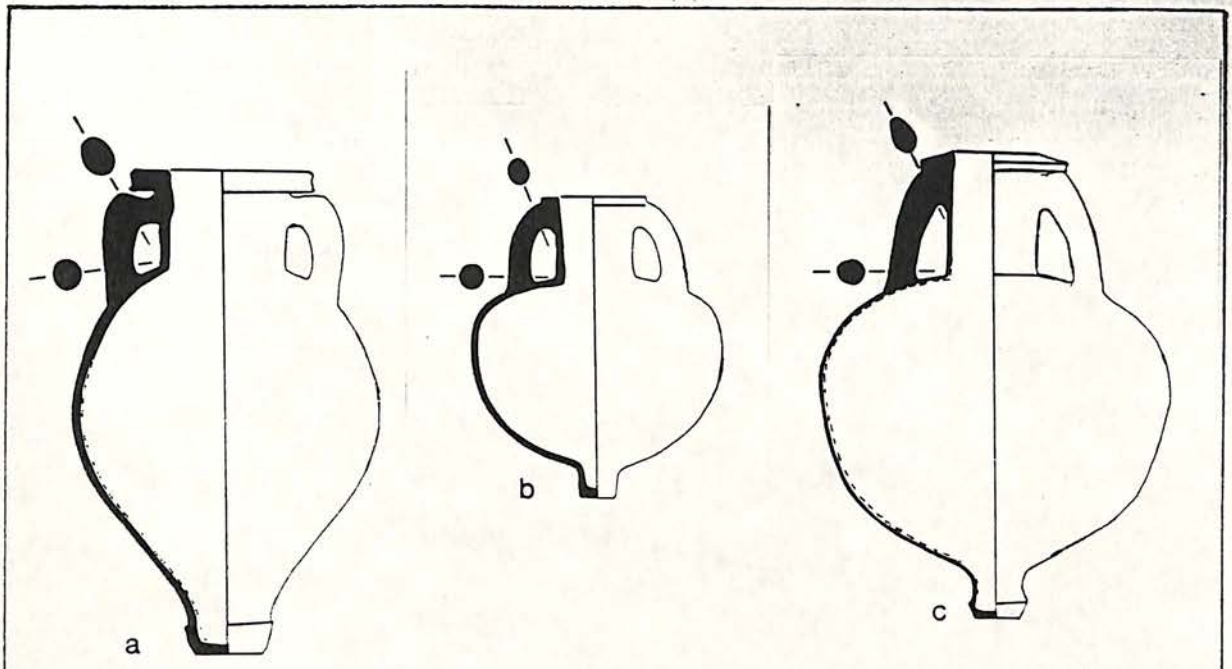

Plate 1. Corinthian A Amphoras (Scale 1:10). a) Corinth C-1962-644, end of Late Protocorinthian. Well 1962-5. H. 0.64 m. b) Athenian Agora P 12795, last quarter of the 6th c. Deposit G 12:3. H. 0.41 m. c) Corinth C-1937-2037, ca. 480. Well 1937-3. H. 0.63 m.

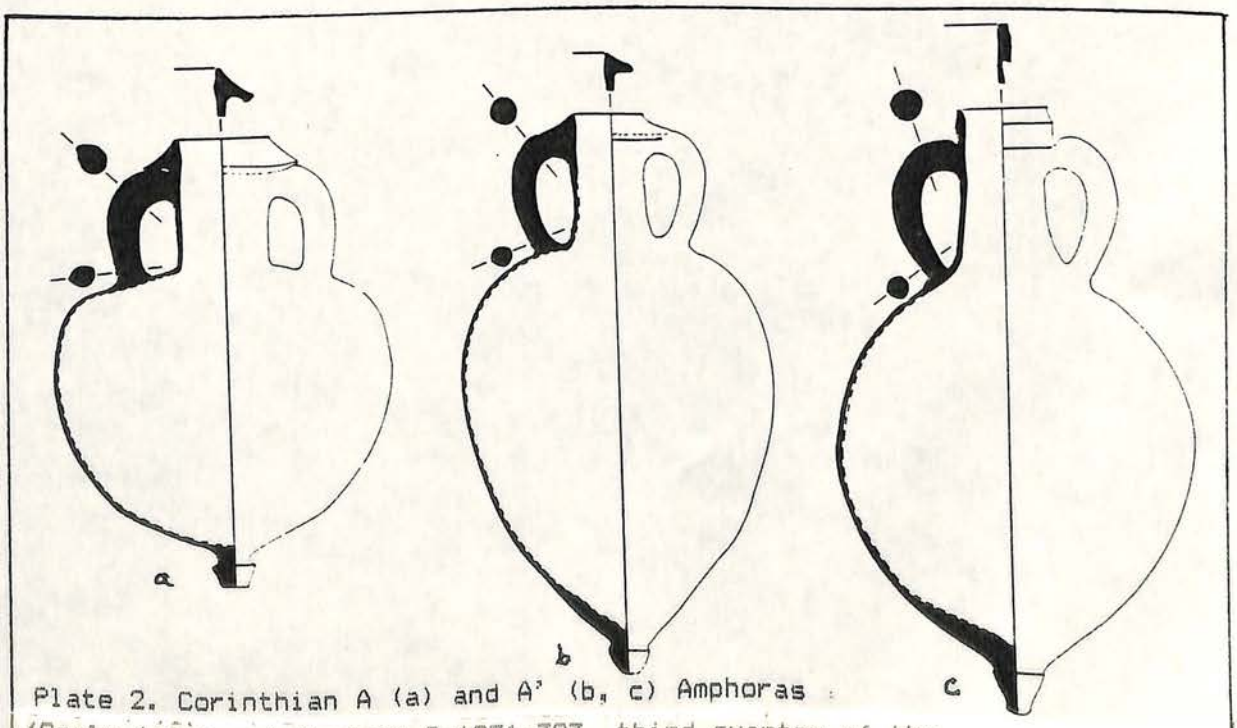

Plate 2. Corinthian A (a) and A' (b, c) Amphoras (Scale 1:10). a) Corinth C-1971-393, third quarter of the 4th c. Cistern 1971-2. H. 0.60 m. b) Corfu Archaeological Museum 7548, 4th c.(?). From the sea. H. 0.72 m. c) Corfu Archaeological Museum 7954, mid-3rd c. From the sea. H. 0.79 m.

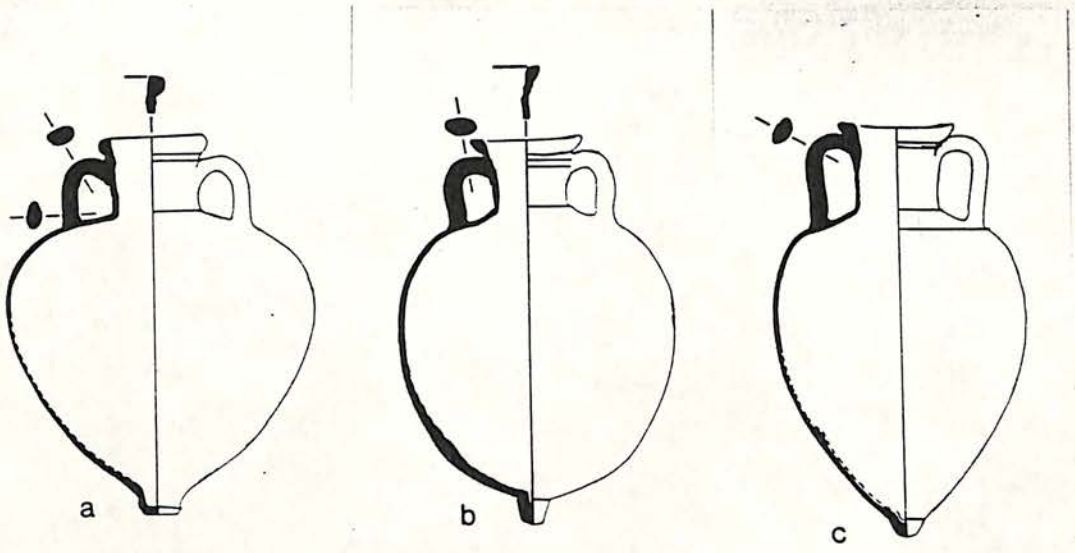

Plate 3. Corinthian B Amphoras (Scale 1:10). a) Corinth C-1937-2042, late 6th c. Well 1937-3. H. 0.50 m. b) Corinth C-1975-69, 460--440. Pit 1975-1. H. 0.51 m. c) Corinth C-1972-118, mid-4th c. Pit 1972-1. H. 0.55 m.

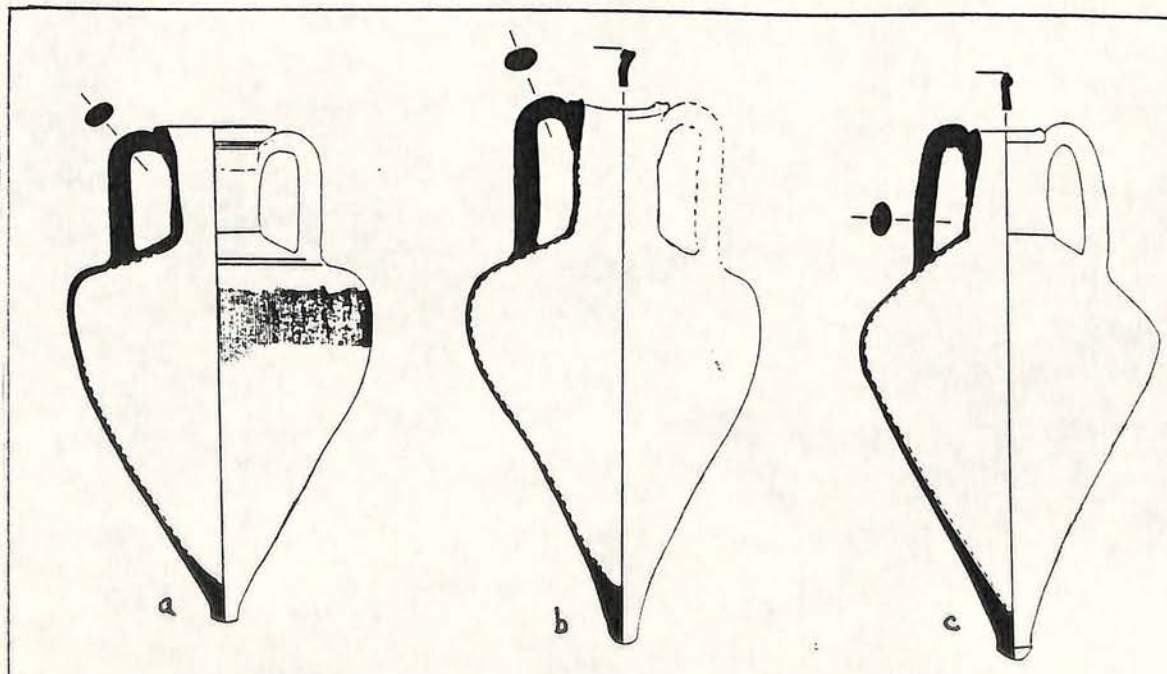

Plate 4. Corinthian B Amphoras (Scale 1:10) a) Athenian Agora P 6395, last quarter of the 4th c. Deposit D 15:3. H. 0.68 m. b) Corfu Archaeological Museum 7962, second quarter of the 3rd c. From the sea. H. 0.84 m. c) Patras Archaeological Museum, uninventoried (CK15), mid-3rd c. From the sea. H. 0.70 m.

From M. Farnsworth, "Types of Greek Glaze Failure," Archaeology 12, 1959 [3]

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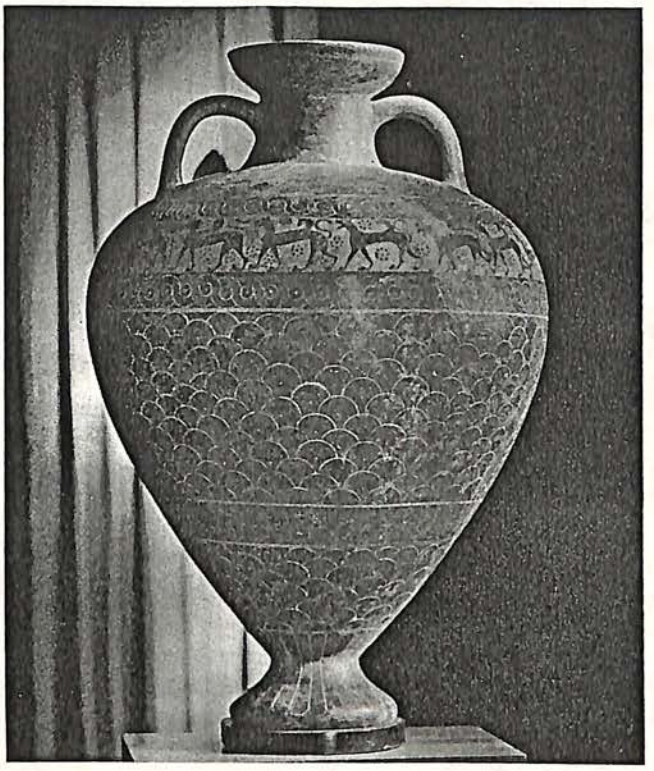
Offprint in the keeping
of CGK.



7. *Left: Lung-Ch'uan yao* celadon vase of the Sung dynasty (960-1280). This is an example of true glazed ware. The ferrous iron has gone into solution and imparted a light green color to the lustrous glaze. 10 3/16 inches high. Photograph courtesy of Freer Gallery of Art, Washington.

8. *Right:* Protocorinthian amphora, dating from the mid-seventh century B.C. A part of the reduced iron has gone into solution and imparts a slightly greenish cast to the black glaze. Height 28 7/8 inches. Photograph courtesy of William Rockhill Nelson Gallery of Art, Kansas City.

Ht ca .73?

5.III.86
Discussed yesterday with CGK. She did not know of other such full-sized amphoras that are decorated. Also, in Cor. B plain jars do not go back 7 2/2 6th cent. at this earlier period, & still use a Samian cloth

Cor.
Further suggests that B was for oil,

boat" from Lerna (Figure 6). This vessel of brown glazed ware has a black "shadow" of another sauceboat against which it was stacked. Since Greek glaze, as mentioned above, does not melt as a true glaze does, but only on the edges of the glaze particles, the ferrous (reduced) iron does not dissolve but, for the most part, stays suspended and imparts a beautiful black color to the surface. If the glaze is overheated, the reduced iron tends to revert in part to the oxidized form (ferric iron) and also, in part, to go into solution in the glassy part of the glaze rather than to remain entirely suspended in the form of minute particles. The main part of the glaze on this sauceboat is a glossy brown, which means that it was overheated. Where the vessel was protected from overheating by stacking the glaze remained black. If the pot had not been overheated, the main part of the glaze would have been black while the protected, underheated part would have been red.

Ferrous iron in solution in a glass (a true glaze) is green and not black. The beautiful Chinese celadon ware (as shown in Figure 7) has a reduced glaze and is colored green by dissolved ferrous iron. Although in the Greek semi-glaze the iron compounds are generally only suspended in colloidal form (that is, as very fine particles), at times enough ferrous iron dissolves to give a definitely greenish tint to the glaze. A good example is a Protocorinthian amphora (Figure 8) in Kansas City. The slightly greenish cast of the black glaze, combined with accessory red, makes a very pleasing color combination. This is an example of a slight misfiring which is beautiful as well as instructive.

The next four examples of misfirings show different degrees of the same basic fault—the firing temperature was not high enough for both of two glazes used on the same vessel. The temperature required for any particular glaze depends on the size of the clay particles

⊗ Very likely some were discarded, because it was assumed they would be plain, as long. See Burgon on the Burgon amphora

1 Nov 1984

Card being put away
- used by C.g.k.

(Mainly lids)

P 9079
P 14,441
P 19,866
P 23,274
P 24,048

ASCS, 54 Swedias Street, Athens 106 76

May 21, 1984

Dear Carolyn,

Not sure if this will catch you, now I know your schedule from your letter of May 11, brought by John Oakley. The Immerwahrs, who have been here for some time now, just got a letter from me that did not reach their address in America before they left! Oh dear. Iwrite such few letters.

I enclose a copy of a communication from the Ministry, which will make you appreciate Mr. PapaX's letter you already have. Maria laughed at this one, saying it was just the kind of thing produced by symvoulia - she had worked with them. All this fuss because I was concerned that Mr. PapaX not think I have lost interest in his material. Actually the rubbings collected under difficulties and without any notes on the jars, because the one day they got to work in the apotheke in Rhodes, Maggie fell ill with one of her bad colds, and whatever was done had to be done by David J., or Dugald, or Manbli, those rubbings on being processed by AΔ have produced an interesting set of combinations, with lots of news in them. I need photos of the jars, to confirm and develope the news by the shapes. Maria says there is nothing in the Ministry's communication to say I can't have photos. So if Mr. PapaX. agrees, and you had time during that brief visit, perhaps you could shoot at least side views of the jars. I am about to send copies of the duplicates to PapaX., and will probably suggest we could help his staff member with a publication of these jars, in other matters than just the readings, one of which would be an exhibit of how to photograph amphoras.

A formal letter from Mrs. Touloupa on the Akropolis, addressed to the French School with a copy for us, says that it is permitted for the Greek amphora group in September to visit the amphora collection in the Museum of the Ancient Agora.

Congratulations on being both godmother and senior aunt!!

umbc UNIVERSITY OF MARYLAND BALTIMORE COUNTY
Catonsville, Maryland 21228
Department of Ancient Studies 301-455-2106

6.01

May 11, 1984

Dear Miss Grace,

This will call upon epigraphical/~~paleo~~graphical skills to decipher, but it will serve to let you know I am 1) nearly finished with classes (as of the 15th); 2) preparing to leave for Gela on May 31; 3) successfully through all but the final stage of my promotion and tenure review; and 4) very much looking forward to seeing you on June 23rd when I arrive in Athens. With luck, I'll find a kind soul at the Managing Committee meeting tomorrow to carry this straight off to Athens. The bouncing of the ATTICAK train on which I sit, northward-bound, is somewhat to blame for the scrawl you are trying to decipher.

I was pleased to have the day before yesterday the packet of letters from Lucy, which I am still going through. They do encourage one to keep up the good fight for amphoras! Maggie is sending me a copy of your letter to Papachristodoulou so I shall better understand his letter on the Rhodian situation. I think Mac and I shall go by Rhodes on our way to Bodrum in August (or late July) for a brief stop.

I was very glad to hear from you some weeks ago, and had hoped to write sooner. Now without having brought that letter with me in my rush to the train station, I am unable to respond to all of its contents, but I am grateful you looked at the Corinthian volume and shall be

umbc UNIVERSITY OF MARYLAND BALTIMORE COUNTY
Catonsville, Maryland 21228
Department of Ancient Studies 301-455-2106

glad to know of your suggested improvements. I should be in Athens for the rest of June and for most of July, working on the talk for the French conference. We don't yet know exactly when we'll be in Bodrum, though I am still assuming the first two or three weeks in August; I've just written Fred van Doorninck there. And I've talked to Cemal Pulak on the phone, as he's in Texas just now. It seems, unfortunately, that he will be diving on the Bronze Age wreck at Kaş when we're in Bodrum, which is not to be helped. Anyway, with measuring to open and close my summer research, the paper for the conference in between, and thoughts on the book, it will be a full three and a half months. I'll be showing the amphoras at the Agora to the two summer sessions, too.

My parents and youngest sister (Kristin) will be here May 23-28 for my sister Janey's graduation from med. school. Mary Ruth (Kochler #2) and her husband will remain in Denver, tending to Elizabeth Anne, born April 5. I am godmother as well as senior aunt! And very pleased on both counts.

I understand the Greek spring has been as chilly and ~~cold~~ rainy as ours. Today, at least, is lovely, and I'm going up to NYC a little early, to look at two exhibits at the Museum of Natural History: one on early hominids and one on the great Silk Roads.

Thinking of you often, With much love, Carolyn

CORINTHIAN (CORINTH)
(ca. 600 B.C.)

7

American School of Classical Studies
54 Swedias Street, Athens 140 Greece

August 17, 1983

Kyle M. Phillips, Jr.
Via San Giovanni, 8
50124 Firenze
Italia

Dear Kyle:

As Mrs. Petropoulakou wrote you for me in July 1977, your small amphora, AJA 81, 1977, p.93, figs. 21, 22 is Samian "and seems to be datable in the early 6th century B.C." She referred you to my article Hesperia 40, 1971, pp. 52-95 on Samian amphoras; on pp. 79-80 of this article, is given the evidence showing that these jars carried oil, not wine. On pl. 15, no. 2, is a little jar in Samos which may be compared with yours, see its description p.93. But now there are a number more found by Samian fisherman that have a body shape more closely resembling yours. The variations in body shape seem intended to produce various capacities. Oil was expensive, so it was natural to carry it in small containers. The little dipper found with yours (your figs. 24, 25), as you say, suggests oil rather than wine as contents. Not mentioned, I think, in that article, is the "Samian lekythos" you speak of in your recent letter (22.VII.83) but perhaps that also would point to oil. I have some text on Samian amphoras in the Blankenhagen festschrift (1979), see pp. 118-120 of that volume; a Soviet scholar had also identified the Samian shape.

For your other amphora, I had barely time to see that it is Corinthian before the photos were snatched from me by Carolyn Koehler, the expert on that class. She was in the midst of preparations to go back to the US after a year in Greece. She will write to you, but I believe the date you suggested is right for her views. She is to be at the Congress herself.

Photography of Chian pottery, see ITALY: MURLO

As a consultation fee, send me a print of your Samian at scale 1 : 10, that is, in the picture the jar should be exactly 0.04 high, since you say its height is 0.40. Then we can compare it nicely with my published little Samian, of which the height is 0.434; I enclose a print. (A visible scale does not help. You have to measure the jar on the ground glass of the enlarger.) This will be your publication photo, and you will agree to let me use it later, with some supplementary information on Samian, if I get around to it.

Yours sincerely,

Show me the Samian top, P14694 which must be in Block I. (mark by a dupont) Ask to get it out.

Similar to B, early Samian and Corinthian B

Hesp. 40, 1971, pp. 73-74. The Cor B cited is the one from the Gymnasium Well, as visible in Amphoras, fig. 35.

CGK did not recollect this passage in my Samian article, as in fact there is no plate or full drawing of a full-size (round) Samian jar of that period. (I did not know the Mara jar in time.)

She apparently has not received a copy of my Blandchurchyard article, in which I republish (partially) a Camarina Samian. I look & check the address card — out of place.

She calls my attention to the publication of some "Doric" jars in her Continental article, Hesp 50, 1981, pp. 449-458. I heard this paper at the Centennial, but do not remember reading it. Apparently I do not have a copy. I did not remember the various "Doric" & items she believes to be "Western", and illustrated.

We should look at these together. It is a fact that I don't find a Samian (even among the unpublished) with such a broad & shallow as the

What about their clay? Is it worth?

21.IV.83

C.W. Kocher has the SAH files of Corinthian A + B upstairs (since July '82). She is using them to set her catalogue (for the Corinth volume) and to complete the duplicate card file that she will take to America when the original is left here in the SAH Dept.

Beneath the Waters of Time: Proceedings of the Ninth Conference on Underwater Archaeology [Texas Antiquities Committee No. 6] Austin, Texas 1978, pp 231-239.

EVIDENCE AROUND THE MEDITERRANEAN FOR CORINTHIAN EXPORT OF WINE AND OIL

by
Carolyn G. Koehler
The University of Tennessee

Corinthian A and B transport amphoras illustrate emphatically the interdependence of those who rescue ancient cargoes from the sea, and those who study the large pointed jars used throughout antiquity to carry commodities in bulk from one end of the Mediterranean to another. Underwater finds have proven particularly significant in tracing the distribution of the two distinct but parallel series of jars manufactured in Corinth during the Archaic, Classical, and early Hellenistic periods. Such utilitarian vessels thus serve as a primary index of the trade carried on by this great commercial center for nearly the entire historical period of Greek Corinth, from about 700 B.C. to 150 B.C. In addition, single finds and groups of transport amphoras from shipwrecks off Corfu, Sicily, and Italy have recently helped establish the sequence of developments in shape for both types of jar, when related to material excavated at Corinth itself, at nearby Isthmia, and in the Athenian Agora.[1]

Although the two types of Corinthian transport amphoras are quite distinct as to both shape and fabric, neither series can be studied in isolation. The very attribution of two separate classes of such containers is unique for Greek times, and possibly the deliberate differentiation of their shapes signified different contents. Type B jars, which show occasional traces of an interior resinous coating, may have held wine, as did amphoras from many other Greek cities. The hard red and gray fabric of Type A jars, however, suggests a connection with oil, since it is very similar to the clay used for contemporary Corinthian lamps and jugs containing oil. At certain times Type A amphoras were made of the beige clay common to Type B jars and to other Corinthian coarsewares, but they were always tempered with large bits of a characteristic local mudstone.

Corinthian A transport amphoras formed a portion of the considerable goods shipped from Corinth to the West during the period of Greek expansion in the eighth and seventh centuries B.C. Isolated underwater finds around Sicily add to the numerical count of these early exports, but the chronology of the beginning stages of shape for Type A depends chiefly upon examples excavated on land at coastal settlements around southeast and central Sicily. Most of these have been recovered from cemeteries at Gela, Camarina, and Megara Hyblaea, where such containers were frequently resued as cinerary urns or as coffins for infants. A jar found with grave offerings of Protocorinthian pottery at Gela (fig. 3a) (Adamesteanu 1956:285-286) establishes the Corinthian A series as perhaps the first produced in Greece. Unusually round for a transport amphora, its body lengthens to a broad cylindrical toe; the neck too is large, with a heavy overhanging rim.

The next stage of development is represented by a Type A jar from Corinth itself (Corinth inv. C-62-644), found in a stratified well-deposit of the third quarter of the seventh century (fig. 1a) (Amyx and Lawrence 1975:157-158). Considerable skill and care were expended in turning the subtly faceted rim and bevelled cap toe, qualities which marked the many diverse products of the Corinthian ceramics industry which flourished at this period. Amphoras very like this one appear at Camarina at the time of its foundation a quarter of a century later, and other jars from the archaic cemetery there suggest the evolution in shape of Type A throughout the sixth century B.C.[2]

Recent finds at Corinth (Corinth invs. C-76-368, C-77-120, and C-53-222) pinpoint sixth-century stages in the trend toward a more compact, spherical body, a narrower toe and neck, and a less massive rim (Williams in press,

1. This report is based on research carried out for my Ph.D. dissertation for Princeton University, *Corinthian A and B Transport Amphoras of the Greek Period* (now in final preparation). Besides acknowledgments given in the notes below, I am grateful to Professor T. Leslie Shear, director of the excavations of the American School of Classical Studies at Athens in the Athenian Agora, and to Professor Homer A. Thompson, formerly director there, for permission to publish material from those excavations. Warm thanks go also to Mr. Charles K. Williams, II, director of the Corinth Excavations of the American School, for permission to present material from that site, and for help throughout my studies in Corinth. Most especially I thank Miss Virginia R. Grace of the Agora Excavations, not only for specific assistance but also for continual guidance from the time she first outlined the problem of the two Corinthian amphora series to me in 1971. My investigation of underwater finds of Corinthian jars could not have been done without the generosity of Mr. Gerhard Kapitan of Syracuse. For preparation of the profile drawing I had the help of Mr. Andreas Demoulinis, Mrs. Helen Besi, and Mrs. Diane Peck; for the map, fig. 4, of Mrs. Abigail Camp, and the the photographic reductions and for fig. 3e, of Mr. Eugene Vanderpool, Jr.

2. Thanks go to Dott. Paola Pelagatti, Superintendent of Antiquities for Eastern Sicily, for making it possible for me to examine newly excavated jars at Camarina and to mention them here.

Brann 1956:365). By the beginning of the fifth century, these tendencies result in the squat body of the fractional Type A amphora (A.A. inv. P 12795) from a well in the Athenian Agora (fig. 1b) (Grace 1961:fig. 35, left). Its cylindrical toe is distinct in profile from the body, and its handles are slightly pinched at the top to form a sort of horn. Larger counterparts of this amphora were exported all over the Mediterranean in the late sixth and early fifth centuries, as underwater finds from Chios to Syracuse demonstrate. Two such amphoras from the sea are displayed on the stairway in the Musée Borély, Marseilles, but Dott. P. Pelegatti informs me they were found in Syracuse and transferred to Marseilles in the nineteenth century.

By the middle of the fifth century B.C., the upper surface of the horizontal Type A rim has begun to slant down (fig. 1c); the handles, now more sharply pinched at the top, are occasionally stamped at the base with a palmette. About this time, the body suddenly changes to the ovoid shape illustrated by an amphora from the Filicudi G site in the Lipari Islands off Sicily, now in the Lipari Museum. A dispersed cargo from Syracuse (Porto Grande, Site B) (Kapitan 1973:186) demonstrates the abruptness of this change, since it contains both the heavier and the more gracile Type A shapes (figs. 3b and 3c). To one of these jar tops is cemented a fragmentary Corinthian B neck of the third quarter of the fifth century. The reason for this switch is unclear, but the taller, thinner form for Corinthian A jars lasted nearly a century. An underwater find from Corfu belongs to a subsequent phase in this development (fig. 1d)[3], and the fragments from the Madonnina A wreck near Taranto should be dated somewhat later still on the basis of the increased height and heaviness of the sloping rim. This stylistic chronology supports McCann's (1972: 184-185) fourth century date for a Corinthian A jar top and toe. As with earlier examples of the ovoid-bodied jars, the handles are round in section at both attachments.

Corinthian A jars resume a spherical body shape, however, about the middle of the fourth century B.C. (fig. 1e). Immediately recognizable characteristics of such jars are a peg toe (which provides a firm grip for lifting) and a heavy overhanging rim which rests on the spiny top edge of the handles. A palmette is often stamped at the base of one or both handles at this period, and occasionally a single letter or monogram appears on the upper flat side of either handle. Compared with the number of late fifth and early fourth century Type A jars found in the west, there is a dearth everywhere of exported examples of the spherical Corinthian A jar belonging to the second half of the fourth century.

This situation reverses itself around the turn of the fourth to the third century, which marks a return to the ovoid body and conical toe typical of the fragmentary Type A amphoras from the shipwrecked cargo at Stentinello near Syracuse (cf. fig. 3d, a complete jar from the sea around Corfu) (Kapitan 1976:90-91). That cargo, with more than one hundred and twenty Corinthian A and B jars together, plus another wreck at Savelletri near Brindisi with many A and B amphoras (Kapitan 1972:3-16, Kapitan 1973:185-186, Kapitan 1976:101), especially points up the extensive Corinthian export of oil and wine early in the third century B.C. Pieces from the Savelletri cargo represent the latest phase in the development of Type A jars: the tall vertical rim with slight bevel at the midpoint, the flaring neck, and the cap toe with compound curve are established by the middle of the third century (cf. fig. 1f, a similar jar from Corfu).

Amphoras of the Corinthian B series exhibit a more regular evolution of shape than do those of the Corinthian A class. Numerous dated jars and fragments at both Corinth and Athens attest the shape of the earliest Type B jars, which belong to the last quarter of the sixth century B.C. (Campbell 1938:605, fig. 27 and Grace 1961:fig. 35). Already the characteristics of the class are clearly defined: the rounded, outward-thickened rim, the ridge or offset band around the top of the neck, and the upward arch of the handles. Then about 480 B.C., several changes begin to appear which become established as features of the Classical period by the middle of the fifth century (fig. 2b) (Williams and Fisher 1977:106-107, pl. 19). Jars similar to this one with flaring rim, ovoid body, and pointed cap toe are found on vessels from many sites in Greece and also in the West.

From this point on, the body on Corinthian B amphoras gradually lengthens and narrows, following a tendency general for most transport amphoras throughout the Greek period. From the beginning of the fourth century, the toe is formed together with the body and continues its profile, although set off at first by a deep groove (fig. 2c). By the end of the fourth century, neck and

3. I wish to thank Mr. Angelos Choremis, Ephor of Antiquities in Corfu, for allowing me to study this jar and those in figs. 1f, 2e, and 3d, and to include them here.

handles are proportionally taller, and the elongation is even more pronounced (fig. 2d). Often a band of "paddling marks" accentuates the broadest part of the body just below the shoulder, made by pressing a wooden stick or paddle against the wet clay as the jar revolved on the wheel. The flaring rim, still with a ridge or groove (or two) at its base, is pressed by the handles, and the mouth is thereby squeezed to an oval shape (fig. 3e).

The still more exaggerated piriform body of the jar in fig. 2e can be dated to the early third century B.C., since it can be compared with the nearly thirty similar jars from a deposit buried in the destruction of Gela in 282 B.C. (Orlandini 1956: 356, fig. 1a). The latest of the Corinthian B necks from the Stentinello wreck are approximately contemporary with this important group at Gela (Kapitan 1976:90-91, fig. 3). Slightly later and datable to the second quarter of the third century are a jar from the sea now in the collection of the American School of Classical Studies at Athens (fig. 3f), and pieces from the wreck at Savelletri (Kapitan 1972:9). Corroborative evidence for the chronology comes from the Type A jars carried in both the Stentinello and Savelletri wrecks. On the jar tops from Savelletri, the rim shortens to a roll above which the heavy handles arch, and the toe develops a slight bulge at the bottom. At the same time the point of maximum diameter drops well below the shoulder, and since an underwater find in Patras shows a continuation in this direction, it seems to offer a final stage in the evolution of the Corinthian B type (fig. 2f).[4]

Stamps appear on a relatively small percentage of Corinthian B jars, primarily from the middle of the fourth century on. Generally simple monograms or single letters were impressed on the top of a handle (cf. fig. 3e) or at its base, but devices were also popular. These are all likely to be potter's marks, but their significance remains uncertain.

Some uncertainty also exists about the provenance of the class now called Corinthian Type B. The series was once considered to be Corcyrean (Grace 1953:108-109), as the best candidate for the type mentioned in Pseudo-Aristotle as *Kerkyraikous amphoreis* (Aristotle n.d.). A number of jars and fragments of this series have been found on Corfu at the site of Corinth's famous colony of Corcyra, spanning the late sixth to the mid-third centuries. It is difficult to distinguish between Corinthian and Corcyrean clays, but analyses using neutron activation, optical emission spectroscopy and Mossbauer spectroscopy (Farnsworth and others 1977, Jones and others in preparation) have just been completed in an attempt to establish the place of manufacture of this class. At present it appears that some Type B amphoras were actually made in Corfu at certain periods, but it remains preferable to refer to them as Corinthian in view of the greater number and chronological range in Corinth of those demonstrably produced there. Furthermore, the finding of Corinthian A and B jars together in the western shipwrecked cargoes mentioned above strengthens the connection between the two series. Together all this evidence suggests an economic cooperation between Corinth and Corcyra which no other sources document.

These and many other Corinthian A and B jars attest their export in striking quantity and extent. An outline of this primarily westward commerce can now be drawn from underwater and land finds in combination. Many colonists in Sicily, Sicilians and other Greeks as well as Corinthians, seem to have arrived at their new sites with basic supplies in Corinthian A jars. Extensive imports of these amphoras continued throughout the sixth century B.C. at such colonies as Selinus, Gela, Camarina, Syracuse, Leontinoi, and Megara Hyblaea (fig. 4). At most of the same places a few early jars of Type B are found as well. A sprinkling of both classes can be traced around Sicily and nearby islands and around southern Italy during the fifth century. In the fourth century, however, the spherical Corinthian A jars seem to have been used almost exclusively in Corinth, while Type B amphoras were sent as far abroad as Mallorca, one cargo to be shipwrecked at El Sec (Salvador 1972:287-326). Mr. Damian Cerda has kindly shared material from the wreck with me; on the basis of photographs shown me, the Corinthian B jars should be dated at least as late as the third quarter of the fourth century.

From the turn of the fourth to the third century, both types again move freely and widely, with concentrations still throughout Magna Graecia, and with scattered pieces marking routes up the coast of Italy to Cosa and Spina, and along the north African coast from Alexandria to Benghazi and Carthage. Eight stamped Corinthian B handles, in the Musée Greco-romain at

4. My appreciation goes to Miss A. Dekoulakou of the Archaeological Museum, Patras, for assistance in studying this and other amphoras in the museum.

Alexandria, and one Corinthian A are recorded in the files of V. R. Grace in the Agora Excavations of the American School at Athens; Miss Grace has also shared with me information on a Type B jar from Hadra and two miniatures also in the Musee Greco-romain, as well as her notes on a number of Corinthian B stamped handles in the collection of the late Mr. Lucas Benaki at Alexandria. Mr. John Riley of the University of Manchester has brought to my attention several fragmentary and miniature jars of Type B in Benghazi. A single fourth-century Corinthian A jar top from excavations at Carthage, of which Dr. M. Vegas de Wegg sent me a drawing, is notable for its export in this period. Corinthian amphoras are very scarce in the east, although an unexpected number of Type A jars were shipped to the Black Sea, notably to Olbia, throughout the Classical period (Brashinsky 1968:45-48, 1970:12,16-18).

The distribution of both Corinthian A and B transport amphoras provides the key to our understanding of Corinth's brisk overseas trade in perishable produce. Further documentation of underwater finds should afford new evidence of this source for the history of Corinth's economic prosperity in the Greek period.

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Question: Do you have any evidence of the distribution of either A and B among the Greek settlements of the French coast?
Answer: There are very few scattered pieces which turn up primarily off Marseilles, but again they are few and far between.

Question: Do any of either type, A or B or both, turn up in French settlements?
Answer: Just a few. Inland, I have no record of any.

Question: In Alexia which is in the Champagne area of northern France there is some evidence of forms and types of amphoras that seem very much in the shape of the later type A and type B from this paper. Is there a possibility that Marseilles or Massilia was the jumping off point for transport of these type vessels into the interior and into the northern areas?
Answer: I think it is certainly conceivable, and I'd like to have more information on this. These jars really travel an astounding, at least to me, distance to the west. I do have one or two also documented in Spain so I think that's quite conceivable.

Question: Do you have any systematic changes in the numbers of jars found at sites? Is there a decrease westward or could you contour it in terms of areas of continuity?
Answer: I haven't yet been able to do that effectively. It doesn't make a very tidy pattern. We are still working on that, and I'm continually receiving evidence from various colleagues so that eventually I think I can draw up a pretty good schema as you suggest. I mean, obviously they do mainly go to the west and are concentrated quite where you would expect them in Greek colonies around southeastern Sicily with some up the eastern coast of Italy.

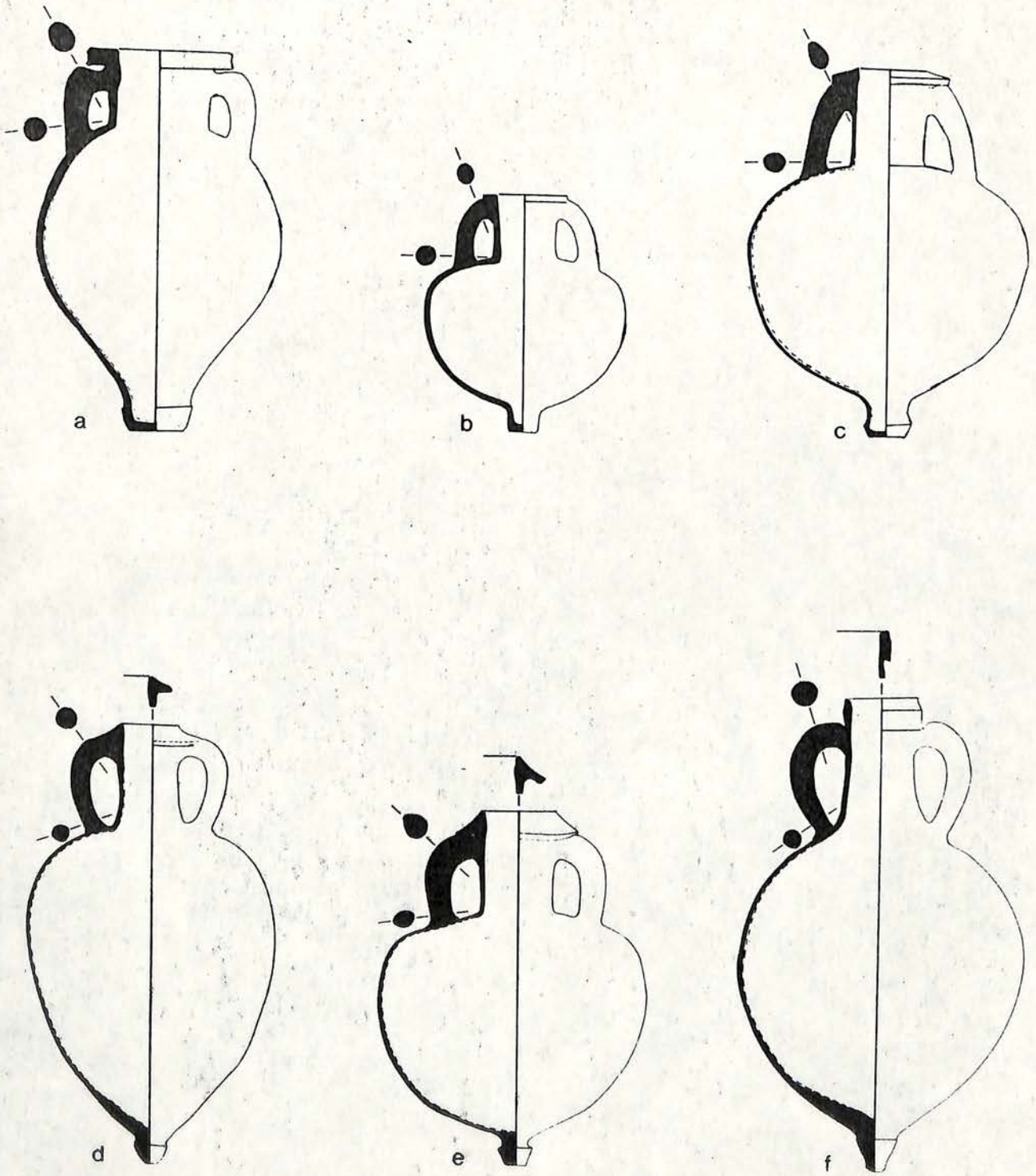


Fig. 1. Corinthian A Transport Amphoras (Scale 1:10): (a) Corinth inv. C-62-644. H. 0.64 m. (b) Athenian Agora inv. P 12795. H. 0.41 m. (c) Corinth inv. C-37-2037. M.T. Campbell, *op. cit.*, p. 605, nr. 201, Fig. 27. H. 0.63 m. (d) Corfu Archaeological Museum, uninv. H. 0.72 m. (e) Corinth inv. C-71-393, from Cistern at 54:I-J, Forum Southwest, third quarter of the fourth century. H. 0.60 m. (f) Corfu Archaeological Museum, uninv. H. 0.79 m.

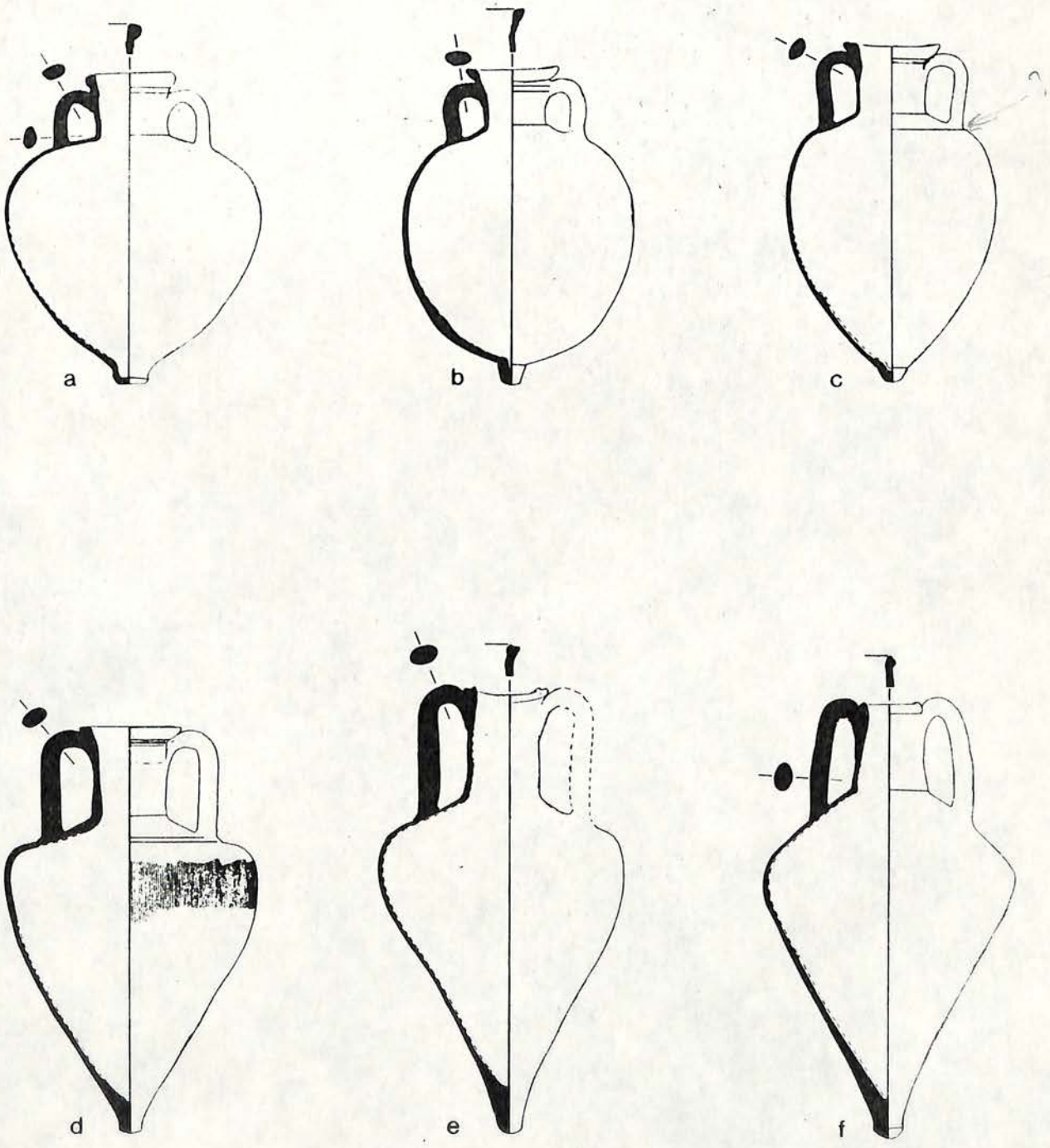


Fig. 2. Corinthian B Transport Amphoras (Scale 1:10): (a) Corinth inv. C-37-2042. H. 0.50 m. (b) Corinth inv. C-75-69. H. 0.51 m. (c) Corinth inv. C-72-118. C.K. Williams, II, and J.E. Fisher, "Corinth, 1972: The Forum Area," *Hesperia*, 42,1973, nr. 27, p. 25, pl. 11. H. 0.55 m. (d) Athenian Agora inv. P. 6395. V.R. Grace, *op. cit.*, Fig. 42, left H. 0.68 m. (e) Corfu Archaeological Museum, uninv. H. 0.84 m. (f) Patras Archaeological Museum, uninv. H. 0.70 m.

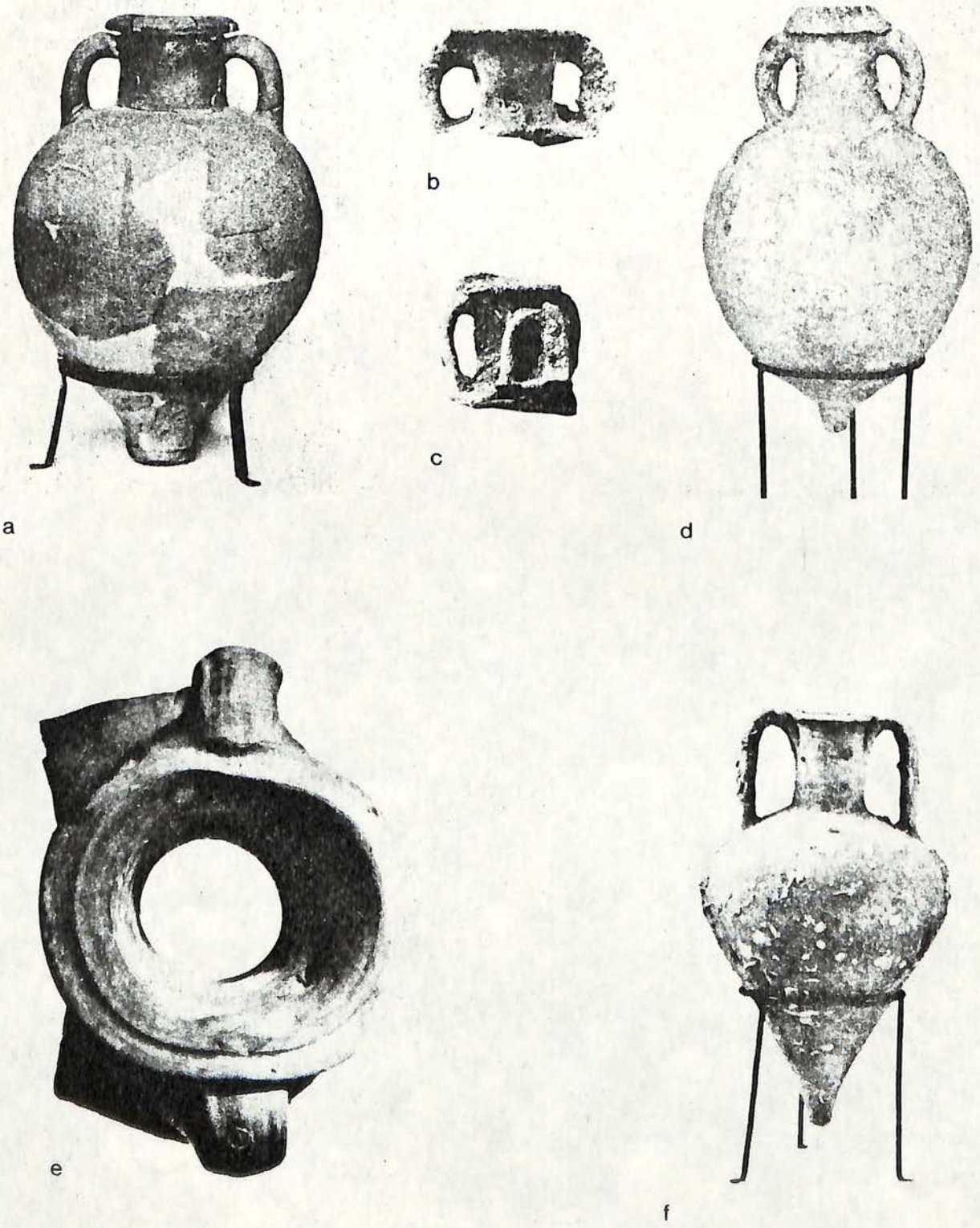


Fig. 3. Corinthian Type A (a-d) and Type B (e,f) Amphoras (Scale 1:10 except for Fig. 3e, approximately 1:4): (a) Gela, Predio La Paglia, Burial 9. H. 0.74 m. (b) Syracuse, Porto Grande Site B, nr. B 10. P.H. 0.20 m. (c) Syracuse, Porto Grande Site B, nr. B9. P.H. 0.72 m. (d) Corfu Archaeological Museum, uninv. H. 0.72 m. (e) Athenian Agora inv. SS 10048. V.R. Grace, *Hesperia*, Supplement X, Princeton, 1956, p. 167, p. 74, lower left. P.H. 0.25 m. (f) Collection of the American School of Classical Studies at Athens, uninv. H. 0.71 m.

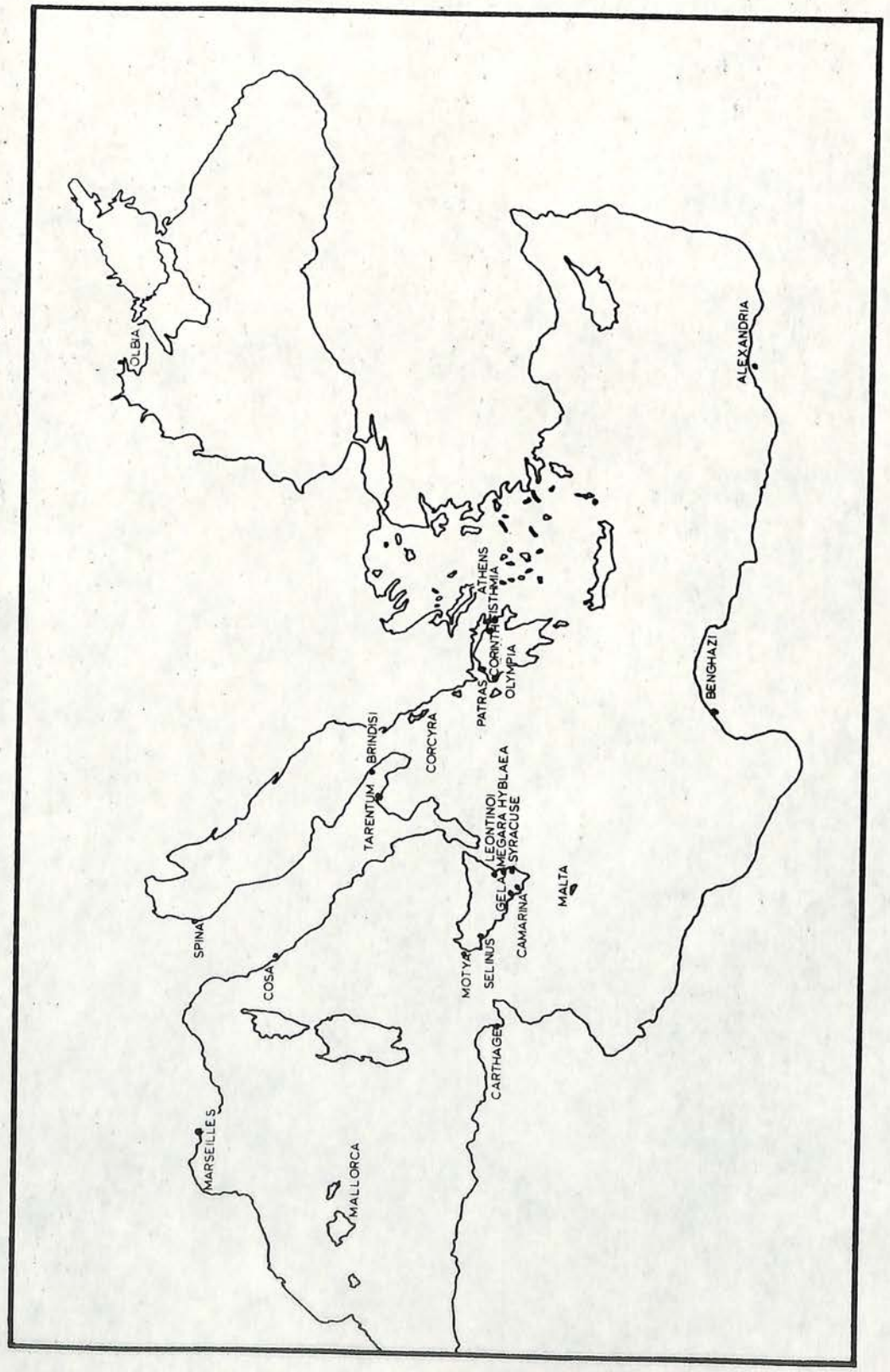


Fig. 4. Major Find-spots of Corinthian A and B Amphoras

Carolyn [illegible]
5520 Ashbourne Rd
Baltimore MD 21227
USA

12 JAN 1992

11.019

AIR MAIL

Miss Virginia R. Grace
American School of Classical Studies
54 Souidias
Athens 140
GREECE

11.016

AIR MAIL

11.02a

January 2, 1982

Dear Miss Grace,

This is not to be the good long letter I'd hoped to write, but I shall settle down to one soon as the dust settles around the Cobbles household. All of us are home for a few days and had "Christmas" - the Santa Claus part, that is, yesterday. This evening is a party for various friends and neighbors,

which should be great fun. I must run upstairs to chop vegetables and arrange the cookie plate, but I wanted to let you know I am thinking of you and wishing you a happy new year and also a very happy birthday. Envision these wishes making their way through blowing snows of a fairisbly decorative sort! With much love, Carolyn

SYMBOLS OF THE FOUR EVANGELISTS

Plaques of champlevé enamel on copper gilt
from a châsse. Spanish, late XI century

THE METROPOLITAN MUSEUM OF ART

Gift of J. Pierpont Morgan, 1917 (17.190.686–695)

7914

11 026

CORINTHIAN 11.03

umbc UNIVERSITY OF MARYLAND BALTIMORE COUNTY
Catonsville, Maryland 21228
Department of Ancient Studies 301-455-2106

January 21, 1982

Dear Miss Grace,

The time has sped by as usual and my Pullman interlude is nearly gone, don't ask me where. It was so good to hear you on the phone. It will be even better to land in Athens late in June (or early in July) for a whole 13 months.

I won't know exactly how the finances will work until April, but I feel sure something will come through. In any case, I shall come, because that is the only way this book will get finished. I shall hope not to bother you too much with my project, although you know full well how invaluable your helps are to me. For the NEH grant I put you down officially as a consultant because they like things all spelled out exactly. In fact, I put in for a consultant's fee for you of $1000., which is figured on the basis of two weeks at $75 a day, the rate suggested by people at the NEH. If the grant comes through, we both win. This does not bind you, however, to giving up two weeks to me; that's just a way of figuring it for the bureaucrats. The recent switch in the program under which I should apply for a grant (Basic Grants, under which all archaeological projects now fit, instead of Individual Fellowships) meant that I suddenly had to prepare an application by mid-October instead of ~~next Jan~~ right now, and so I did not have time to write you then, before everything went in. "Everything" included cover sheet, budget pages, several summary sheets, and a twenty-page narrative explaining the project. At the time, it did not occur to me that maybe the consultant's fee would have to be paid in a particular way in order not to disturb social security benefits, or any other financial planning of yours. IF the NEH monies come through, I'll need to be advised.

Now about Letty. At the opening reception of the San Francisco meetings, Marian told me that Letty had just seen her and said that she'd had a letter from you, and that she was considering withdrawing the article. I told Marian that I felt sure it was not a case of "difference of opinion" about which you had written, but of some ~~scholarly~~ basic questions ~~about~~ such as her method, the establishment of chronology, and so on. I said that of course I could not speak for you, since at that point I had not heard directly from you, but that my own assessment of the article had been that there are serious problems with it. In fact, I wrote the publications committee before its mid-October meeting as follows: "I recommend that "Greco-Italic Amphoras" by E.L. Will be accepted for publication if extensive revisions are made. It will be very helpful to have the material in this article published, if the broad statements and attributions made can be more fully substantiated. Discussions of chronological evidence are not sufficiently precise. I would hope for a more critical assessment of the reasons for changes in shape, and of relationships between the forms and fabrics of "Greco-Italics" and of their Dressel 1 desce ndents." I had hoped to send more detailed comments right away, but did not manage to do so until the time of the meetings. Marian now has those, as well as a few which Susan Rotroff made, and she was going to send them in some form to Letty. In San Francisco, Marian, Susan and I agreed that it would still be good to have the article if it could be properly amended. When I return to Baltimore

I'll phone Marian to see what has happened in the meantime. I very much appreciate your having taken the time to make comments and criticisms, though it was not I who requested them. Perhaps Letty will in the end heed them. I hope. And perhaps Marian, having heard indirectly of criticisms from another source, will take note. Certainly she and the publications committee seem to have read the article without blinking, and do not seem to have taken my written report seriously. Anyhow, from now on it is our baby and we'll see what we can do to get it in some kind of shape. It would indeed help if I saw your comments; I would tell Letty that I had earnestly requested them from you, as I don't think I could read them and discuss the paper with her without saying I had seen them. Do you agree?

Enough of that sort of business! We are in the midst of snowstorm #8, as far as I can count them, since I flew in New Year's Eve. I have indeed had enough winter for all of 1982, and enough snow for the next ten years. Wish I thought the ground conditions in Baltimore would be much better. Still, I have been having a pleasant time with my family, first all of us, and now just my parents. I've caught up with several old friends I hadn't seen since high school, too, and learned that their travels have been as extensive as mine--some geographically so, others in other ways. I've been fed and fattened up a bit, though the aerobic dancing has helped keep me in shape. We are running a welfare station for feathered friends in the neighborhood, and several times a day troop out to the back yard with offerings for the pheasants, finches, and rufous-sided towhees. It's especially fun to watch the small fellows peck away at the peanut-butter-stuffed pine cone hung in the tree.

The mail run is about to be made for today, so I'll close for now. Next installment will have more about classes and Baltimore.

With all best wishes for a glorious 1982,

love,

Carolyn

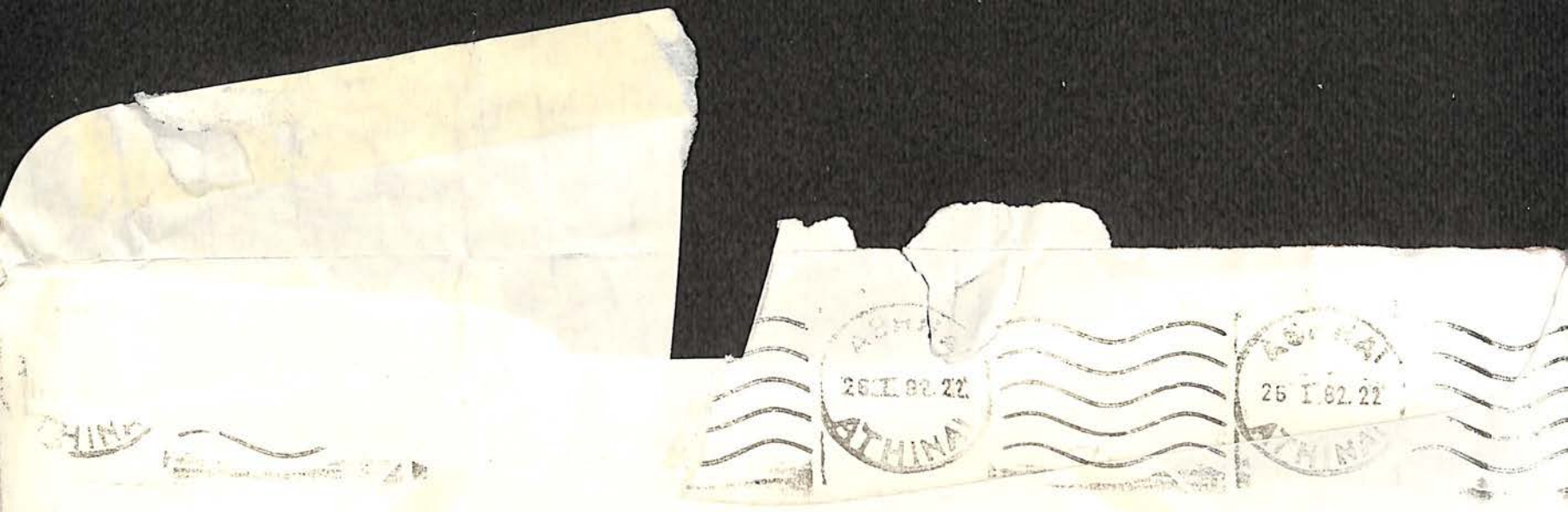
AIR MAIL

11.05a

Miss Virginia R. Grace
American School of Classical Studies
54 Souidias
ATHENS 140

GREECE

AIR MAIL



11.056

1st carb

(2nd carbon + file under ROMAN - GRECO-ITALIC)

12-01

American School of Classical Studies
54 Swedias Street, Athens 140, Greece

February 5, 1982

Dear Carolyn,

Great to have your letter of January 21, with news of your plans and applications, which all sound very promising. I'll let my nephew Nick Grace know about the possibility of an income problem for me - he gets my returns prepared at his law office. (It doesn't affect Social Security, at my age.) It now occurs to me as odd that Gladys Weinberg did not think of doing something like that with her NEH application, for her book on the glass from the Kakoula lot in Rhodes, very important from her point of view, and there is hardly anything to date it by except the quantities of Rhodian stamped handles. I've given her readings ages ago, and dates, and then revised dates, because they are 3rd century largely. Still, she can't publish them herself, and she recognizes that fact. She told me she had got $50,000. She should have asked for a bit more, I see, specifically to compensate us here for our time, to support our efforts.

Of course, if you don't get the money, what with Reagan, not to worry about us, and I have a bit laid up in the Amphora Fund which it would be suitable for you to have, anyhow $1000, really $2000, to help fill out. Because I agree with you that (for various reasons) it will be good for you to come soon.

Does it make any difference to you, if I am away during the early part of your 13 months? I ought to pull myself together and get to the US, and it may work out that late May and June is when it has to be.

You will (I hope) have got on your return my letter to you enclosing a photocopy of mine to Letty about Greco-Italics. She has not let me know that she received the one to her, I only know it through you. I have written to her since then, about a French lady amphorist named Laubenheimer (pronounce in French) who found some examples of "Gauloises 4" in the Agora collection. They turned out to be Letty's Type 18. Her visit was during the New Year's holiday so I could not put her off

on Margot Camp, but I did afterward, for correspondence.

I'm sure you'll like working with Margot, we're lucky to have her. She likes the job, too, and has brought plants and a painting to make the catalogue room more pleasant.

I'm so glad you've had a real visit with your family and old friends. These are precious occasions. Thank you for your Christmas - New Year's - birtoday card written in the midst of the gathering at home. I love having it. Also your telephone call. What exciting weather you've been having! Kephissia has snow, today for the first time this year, lying on the ground - reported by Maria.

I have been trying to read without spending time an article in Italian of which M. Empereur gave me a photogopy: Serena de Luca de Marco, "Le anfore commerciali delle necropoli di Spina," Melanges de l'ecole francaise de Rome 91, 1979, pp. 571-600. It seems not to be cited by Letty, though it is hard to be sure in her long lists not in alphabetical order. (By hunting through, I find she cites my new friend Mme. Laubenheimer.) It does little good in ~~xxxrxx~~ reporting Spina, as it never gives dates for the individual tombs from which the amphoras are said to come. (Or are all the contexts thought to be the same.) Pp. 585-586 on Greco-Italics seems to have some sense. However, what she says about Chian does not, cf. p.584 and pl. III; you wd. think she might have looked a little further on in Picture Book 6, to figs. 44-49. And I doubt whether you will be much informed by the text on Corcyrean, pp.580-583, with all its Variants; still probably you ought to look at it. See pls. I-II. Numerous references to some text by C. Boulter.

13.01

22.X.81 (Carolyn?
Given to me by Margaret
today as for "the bottom of the
basket"

19.IV.83 Cat doesn't need these; they are carbons of originals she has.

13.02

Fr. circled hdles.
Cat. 17.III.76
(1937, X)

Single frag. preserves ca. half of upper curve of handle.

Medium-fine clay, slightly porous. Self-slipped.
Surface: 10 YR 7/4 (very pale brown)
Core: 7.5 YR 7/4 (pink)

Handle fragment of transport/storage amphora. Flattened oval in section.
Stamped on top of curve, slightly to one side in circular field: ^
(gamma or lambda and omicron; lower part of circular letter - omicron- imperfectly impressed)

13.01 23.X.81 (Carolyn?)

Given to me by Margot
looking as from the Golden of the
basket

19.IX.83 CAK doesn't need these; they are carbons of originals she holds.

KTA 623 Cor B SAH Fr. circled hdles.
Cat. 17.III.76
(1937, X)

P.L. .052
W. x Th..047 x .023

Single frag. preserves ca. half of upper curve of handle.

Medium-fine clay, slightly porous. Self-slipped.
Surface: 10 YR 7/4 (very pale brown)
Core: 7.5 YR 7/4 (pink)

Handle fragment of transport/storage amphora. Flattened oval in section.
Stamped on top of curve, slightly to one side in circular field: ⍺
(gamma or lambda and omicron; lower part of circular letter - omicron- imperfectly impressed)

13.03

KTA 621 Cor B SAH fr.circled hdls.
cat. 17.III.76
(1934,)

P.L. .083
W.xTh..046 x .026

Single frag. preserves mosy of upper curve of hdl., with most of upper attchment. Surface battered in places: one-third stamp gone.

Fine, hard, slightly porous clay. Self-slipped.
Break: 5 YR 6/6 (reddish yellow)
Surface: 7.5 YR 7/4 (pink)

Handle frag. fr. transport/storage amphora. Section a flattened oval where stamped. Upper att. flattened where pressed vs. neck and rim.
Stamped on top of curve in circular field: two letters, perhaps O (or C) and I.

Sigma

13.04

KTA 622 Cor B SAH Fr.circled hdls.
Cat. 17.III.76
(1935, r)

P.L. .0683 m.
W.x Th. .045 x .026 m.

Sing. frag. preserves ,ost of upper curve of handle.

Fine hard clay, slightly porous. Self-slipped.
Surface: ca. 5 YR 6/6 (reddish yellow)
Break: 7.5 YR 7/6 (reddish yellow) to 7.5 YR 7/4 (pink)

Handle frag. from transport/storage amphora. Flattened oval in sec.
Stamped on top of curve: ♀ or monogram ♀ (?)

13.05

KTA 624 Cor B SAH Fr. circled handle
Cat. 17.III.76
(1939 NN)

P.H. .076
W. x Th..046 x .023

Single frag. preserves most of upper curve of handle, with large chips broken off. Surface worn.

Medium-fine hard clay, slightly porous. Self-slipped?
Surface: 7.5 YR 7/6 (reddish yellow)
Core: 5 YR 6/4 (light reddish brown)

Handle fragment from transport and storage amphora. Flattened oval in section; still more flattened near upper attachment.
Stamped on upper curve in oval field: monogram

13.06

KTA.625 Cor B SAH Fr. circled handles
(1949, ΣA)
Cat. 17.III.76

P.H. .067
W.x Th. .049 x .024

Single fragment preserves much of upper curve. Broken along edge of stamp.

Fine hard clay, slightly porous. Self-slipped.
Surface: ca. 7.5 YR 6/6 (reddish yellow)
Core (break): 5 YR 4/6 (yellowish red)

Handle fragment from transport/storage amphora. Very flattened oval in section, with pinched edge along one side of curve.
Stamped on upper curve: ΣIM retrograde.

June 5, 1979 149

Dear Miss Grace,

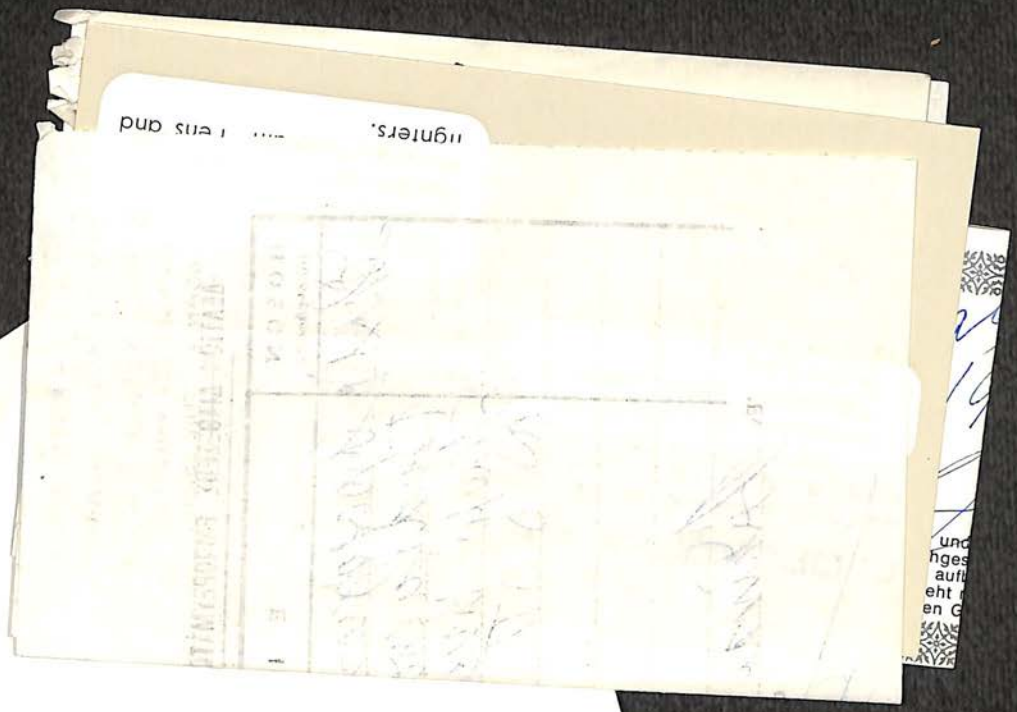
I am sitting at the red TWA lounge at Kennedy, about to head for Rome and Sicily. You should have heard from me sooner (I can't even say oftener, alas) but anyway I can now confirm what Mac has probably stated, that I shall arrive in Athens the 15th or 16th of July, to stay until Aug. 18th. Barbara Johnson and I shall again be fish-sitting for the Katzevs. I shall be home all the time in Corinth, but have first on my list the completion of the Corinth 5th to unhappily abandoned so long. I wish I could get to Mycenae to take those essential photos, but Wally

Childs will not be there until July, by which point I shall be in Metaportum. I shall plan to take whatever photos are necessary at some future time.

I hope you are well, and that the proposed trip to Rhodes went well. What good memories I have of our trip there. It will be wonderful to see you again. In spite of my silent pen, I miss you very much.

Love,

Carolyn



DAWN'S WATCH.

15.01

31. VIII. 79

Virginia Gerace

23. VIII. 78

DANNY'S WATCH.

15.01

31. VIII. 79

Remember this when reading Klein
Klein she kept [illegible]
[illegible]
To wished it Daniel Dunbar's Please
And was under [illegible] since is she
was [illegible] Klein. Black says
she will ask it back.
She did return it

Virginia Grace

23. VIII. 78

carry-on [illegible]
[illegible]

I let him keep Danny's watch
till next time, as she has one
[illegible]

15.02

Γ. ΩΡΟΛΟΓΑΣ & ΣΙΑ

ΒΟΥΛΗΣ 24 & ΜΗΤΡΟΠΟΛΕΩΣ
ΤΗΛ. 3235.016 - ΑΘΗΝΑΙ

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TEL.: 3235.016 - ATHENS

High class Jewelry of gold, platinum etc.
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Watches, Fountain - Pens and lighters.

15:03

Watch given to
me by Danny
Meadows today
3.IX.74

Samantha

15.1049

KIENZLE

GARANTIESCHEIN

KIENZLE UHRENFABRIKEN GMBH
7220 Schwenningen a. N. / BRD

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Konstruktion und Herstellung von einwandfreier
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etwaige Herstellungs- und Materialfehler
ab Verkaufsdatum 1 Jahr Garantie.
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unsachgemäße Behandlung hervorgerufen wurden.

Kienzle-Uhr Nr. _____

1504b

Athen
2/9/1974

Stempel, Unterschrift und Verkaufsdatum
des Uhrenfachgeschäftes.
Bitte sorgfältig aufbewahren!
Ein Garantieanspruch besteht nur bei Vorlage eines
vollständig ausgefüllten Garantiescheines.

15.05

Αριθ. 282

ΔΕΛΤΙΟ ΔΙΑΘΕΣΕΩΣ ΕΜΠΟΡΕΥΜΑΤΩΝ ΕΙΔΙΚΗΣ ΤΕΛΩΝΕΙΑΚΗΣ ΠΑΡΑΚΟΛΟΥΘΗΣΕΩΣ

ΠΟΣΟΝ (ολογράφως)	ΕΙΔΟΣ	ΚΑΤΗΓΟΡΙΑΣ (ολογράφως)
Δηλ	Φορολογικός κιβώτιο	Διμερών
	Τσιγάρα σημασμένα	
	χωρίς ετικέτες	
	ΦΠΑ 1918	

Έν Αθήναις τῇ 2/9/ 197

Ο ΠΩΛΗΤΗΣ

27.VI.80

16

Publications with aid of C.G. Koch's

See B. Adamówna, Kendzierzawa, for C.G.K's stamp plates published; many are of Corinth.

Note for Carolyn

Had meant to write a note to Carolyn about the G.B. jar in the Kelsey Museum in Michigan, from Karanis, which looks remarkably like P 6795, 6796 (her nos. 90, 91) from C 9:7, — but has stamps on either handle saying

BATON (Latin) HPAIOC

She had more wanted them item much in her series anyhow.

My note was to go via B. Johnson, was not ready, B. will tell Carolyn about the jar. C. will see it after Xmas.

I knew this object in a colour plate, from ELW who just happened to see it in the museum while visiting there. Now Barbara Johnson is to publish the pottery from Karanis, and there is some puzzle as to how anyone else was allowed to plate it. B. says ELW has a friend in the museum. and perhaps it just is on exhibition, and ELW snapped it ("under difficulties" she said). B. Johnson is quite waiting for ELW to publish it. She will take all this up with her when in the U.S., and proposes I not write to ELW about the matter of permission.

There still seems to be that air de famille of this shape with Corinthian. Need to be thought out.

rec'd f CGK 17. VIII 79

19.01

CORINTHIAN A AND B TRANSPORT AMPHORAS

CAROLYN G. KOEHLER 1978

CONCORDANCE LIST

	Thesis no
CP44	50
CP58	3
CP1574	394
CP1828	461
CP1834	421
CP1845	135
CP2681	390
CP2805	28
CP2806	743
CP2808	7
CP2810	247
CP2814	215
CP2816	30
CP2817	25
CP2819	26
CP2821	386
CP3008	281
CP3042	628
C-31-374	755
C-31-375	710
C-31-376	731
C-32-29	187
C-32-30	308
C-32-31	524
C-32-302	631
C-33-119	699
C-33-1476	480
CP1846	129bis

	Thesis no
C-34-472	289
C-34-932	44
C-34-933	31
C-34-934	231
C-34-472	289
C-34-2526a,b	690
C-36-106	502
C-36-112	640
C-36-114 (base formerly C-36-128)	98
C-36-179	570
C-36-498	586
C-36-759	417
C-36-2404	197
C-36-2405	169
C-36-2453	203
C-37-110	419
C-37-298	238
C-37-316	246
C-37-326	701
C-37-327	695
C-37-328	726
C-37-330	762
C-37-332	754
C-37-333	708
C-37-336	141

C-37-376	56
C-37-402	233
C-37-408	55
C-37-577	47
C-37-587	691
C-37-647	474
C-37-918	17
C-37-928	15
C-37-929	16
C-37-931	4
C-37-1030	618
C-37-1085a	706
C-37-1196	344
C-37-1199	663
C-37-1203	632a
C-37-1208	146a
C-37-2037	29
C-37-2038	37
C-37-2040	41
C-37-2042	241
C-37-2043	38
C-37-2044	213
C-37-2306	753
C-37-2432	533
C-37-2434	515
C-37-2439	336
C-37-2443	119
C-37-2444	174
C-37-2673	544
C-37-2689	547
C-37-2697	666
C-37-2764	746
C-37-2767	182
C-38-599	732
C-38-606	131bis
C-38-673	99
C-39-382	554
C-39-385	718
C-39-393	525
C-39-394	424
C-39-397	42
C-39-398	33
C-39-399	232
C-39-442	189
C-40-4	625
C-40-5	376
C-40-6	667
C-40-8	521
C-40-9	97
C-40-27a,b	181
C-40-325	8
C-40-404	65
C-40-405	78
C-40-412	445
C-40-414	48
C-40-418	362
C-40-422	498
C-40-489	772
C-40-490	767
C-40-492	598
C-40-493	668
C-40-494	411

C-38-606 131bis

C-40-495	531
C-40-497	148
C-40-498a,b	13
C-40-626	258
C-40-627	259
C-40-629	260
C-40-630	303
C-40-631	304
C-40-635	132
C-40-639	744
C-40-640	74
C-40-641	67
C-46-3	624
C-46-87	290
C-47-846	292
C-47-904	59
C-47-905	183
C-40-906	58
C-47-911	574
C-47-913	92
C-47-914	746bis
C-48-13	294
C-48-54	293
C-48-250	199
joined with C-71-610	
C-49-17	126
C-49-36	440
C-53-2	464
C-53-222	21
C-59-9	329
C-59-95	100
C-59-96	605
C-60-74	285
C-60-160	546
C-60-163	477
C-60-166	383
C-60-169	599
C-60-170	516
C-60-172	138
C-60-179	101
C-60-265	493
C-60-266	377
C-60-272	384
C-60-273	632b
C-60-277	669
C-60-343	307
C-60-344	670
C-60-346	86
C-60-347	72
C-61-52	703
C-61-68	529
C-61-73	698
C-61-185	122
C-61-231	127
C-62-141	457
C-62-146	643
C-62-148	102
C-62-149	388
C-62-150	171
C-62-151	146b
C-62-236	190
C-62-251	366

C-62-297	495
C-62-643	11
C-62-644	9
C-62-672	10
C-62-881	12
C-62-936	367
C-62-949	288
C-62-950	177
C-62-953	57
C-62-955	476
C-62-956	133
C-62-957	475
C-63-544	702
C-63-673	581
C-63-690	252
C-63-723	556
C-63-724	276
C-64-8	434
C-64-17	60
C-64-27	61
C-64-28	406
C-64-198	140
C-64-204	147
C-64-209	425
C-64-243	747
C-64-248	120
C-64-376	287
C-64-377	481
C-64-378	596
C-64-380	96
C-64-381	671
C-64-384	66
C-65-6	355
C-65-22	520
C-65-110	173
C-65-203	513
C-65-310	617
C-65-396	734
C-65-528	696
C-65-561	71
C-65-571	470
C-65-574	156
C-66-16	378
C-66-20	523
C-66-32	534
C-66-33	412
C-66-44	368
C-66-48	312
C-66-72	589
C-66-78	365
C-66-121	540
C-66-242	527
C-67-60	764
C-67-76	584
C-67-93	588
C-67-101	761
C-68-38	93
C-68-39	426
C-68-70	427
C-68-73	742
C-68-93	704
C-68-94	705

18.05

C-68-116	399
C-68-119	768
C-68-225	611
C-68-285	471
C-68-335	188
C-69-101	633
C-69-105	619
C-69-106	649
C-69-177	358
C-69-183	340
C-69-274	345
C-69-306	379
C-69-309	672
C-70-4	103
C-70-5	94
C-70-8	150
C-70-15	692
C-70-16	592
C-70-20	494
C-70-56	130
C-70-58	381
C-70-59	180
C-70-60	142
C-70-111	469
C-70-112	361
C-70-113	472
C-70-153	752
C-70-161	73
C-70-210	720
C-71-1	614
C-71-10	243
C-71-18	352
C-71-44	104
C-71-144a,b	178
C-71-172	356
C-71-183	591
C-71-184	163
C-71-233	568
C-71-237	279
C-71-334	68
C-71-393	62
C-71-395	244
C-71-528	69
C-71-555	153
C-71-572	75
C-71-576	63
C-71-577	248
C-71-578	241
C-71-579	242
C-71-582	566
C-71-586	160
C-71-593	736
C-71-594	549
C-71-595	673
C-71-596	563
C-71-597	128
C-71-600	251
C-71-601	168
C-71-603	105
C-71-604	106
C-71-605	170
C-71-606	514

C-71-607	302
C-71-608	403
C-71-609	575
C-71-610	199
C-71-611	191
C-71-612	64
C-71-613	155
C-71-614	129
C-71-615	192
C-71-620	278
C-72-23	479
C-72-50	143
C-72-51	151
C-72-63	131
C-72-118	240
C-72-119	721
C-72-123	245
C-72-154	664
C-72-207	125
C-72-250	95
C-72-251	176
C-72-252	164
C-72-253	111
C-72-259	218
C-72-261	43
C-72-262a,b	760
C-72-263	144
C-72-265	167
C-72-266	161
C-72-336	165
C-73-93	462
C-73-198	500
C-73-282	136
C-73-314	158
C-74-34	636
C-74-38	331
C-74-39	204
C-74-62	404
C-74-101	674
C-74-112	645
C-75-11	107
C-75-13	393
C-75-28	396
C-75-67	195
C-75-68	123
C-75-69	229
C-75-72	196
C-75-132	70
C-75-201	653
C-75-202	571
C-75-207	209
C-75-249	496
C-75-250	184
C-75-321	193
C-76-75	207
C-76-76	194
C-76-77	45
C-76-78	46
C-76-82	134
C-76-112	517
C-76-117	175
C-76-129	157

C-76-131	172
C-76-169	737
C-76-203	154
C-76-236	162
C-76-272	727
C-76-274	600
C-76-281	351
C-76-282	152
C-76-283	551
C-76-284	76
C-76-297	159
C-76-368	18
C-76-369	206
C-77-120	20

sf

2. XI. 78

19

my letter of 27. X. 61 to B. V. Bothmer would be part of a correspondence in the PICT. BK. CORRIGENDA is said to be in the CORCYREAN file.

Get CGK to return this letter file, which ought to be here. She can take photographs.

21. IV. 83
returned by CGK
(photocopies taken)

31. VIII. 79 from B Fehl

CGK
Dept of Ancient Studies
Univ. of Maryland, Baltimore County
5401 Wilkins Ave,
Baltimore Md.

CORINTHIAN

20

Athens, Friday Oct. 13, 1978

GREECE - MAINLAND
HALIEIS

Dear Carolyn,

In one of my desultory bouts of clearing away, I find the enclosed notes and phots. of items from Porto Cheli - Halieis, with a covering note from M. Jameson dated 13.VIII.[74]. In this note he says, "I had comments once from you on the pi stamp but you may have new thoughts now." I don't find a copy of those putative ~~xxxxxxxx~~ comments. Also, I don't find this item on file in the Corinthian B file. So perhaps you have never had it? Perhaps you got it directly from him or other member of the staff there. In any case, in this old note he says he would be glad to have the photos back, so after having looked at them you might send or give them (at the Meetings?) back to him. Give him the benefit of the latest knowledge about HP 232; tell him that VG does not recognize the amphora-top HP 403 (but perhaps you do), and that she does not know about graffiti (HP 467). Thank you very much, and you would not be wanting to leave out this nice Cor. B. item from your publication.

evidently about HP 232,

Many congratulations on your London paper, which the Immerwahrs told me was a great success - applause and much discussion!

You'll be glad to hear that the box with the Enserune Massaliote fragments turned up, and is now shelved where it belongs, with other boxes of samples, on top of the last Rhodian cabinet. However Michael Katzev told me I think that by this time you have (access to?) other Massaliote fragments. He came one day to show me some phptos of jars in a private collection, from somewhere off Spetsas I think (they had marine deposit). About one of these jars I said it looked rather like a variation of / "Greek Brindisi". And he said, Or perhaps like Amphoras, fig. 38, and he pointed out the Corinthian (?) jar. I was sorry not to have the file of these jars, so we could consider their variations they show. Ask Michael to show you some time the jar in question, the one in Spetsas.

Maria and Andreas are here, not Maggie, who, though arrived in Greece, is on an excursion with the McKays, her cousins, to beyond Thermopylae. We all

send you best wishes for ΚΑΛΗ ΕΠΙΤΥΧΙΑ in your final examination.

CORINTHIAN

2.IX.78

21

Misc. to go for CQR

2.IX.78 See SICILY : MORGANTINA for a Letter & CQR of today's date

July 18, 1978 22.01

Dear Miss Trace,

I was very pleased to have your letter of the 17th, forwarded to me from Tennessee — just after I had mailed mine to you. In the meanwhile have come various settling-in manoeuvers in Baltimore, and the beginning of my summer's trek with three days in New York. I have just found out that my flight to Athens leaves this Wednesday, the 26th, though I still don't know the hour. This is a bit sooner than expected, but such flights are harder to come by right now. I return August 23rd, so my schedule is not radically altered except for the initial few days.

Indeed, I have been uncomfortably conscious of having kept the files longer than anticipated, since we had hoped they could make their way back at Christmas. But I certainly would not have taken them if I had not clearly understood you were giving me express permission to do so, albeit we agreed that ~~circumstances~~ it was a most regrettable necessity. I have used them and am of course finished with them as far as the dissertation goes. Thursday I am going to Cambridge to discuss some of the stamps with Ron Strond, and so wring a last service from them.

Since I don't know whether Mr. Shear will be ready to see me right away about the dissertation, perhaps I could start right off on those Corinthian duplicates. They are, of course, the main endeavor I left undone, and I see with some surprise that I did not specify in my letters that I intended to finish them off. They too have haunted me. I shall look forward very much to catching up on everything!

As for a place to stay, I thank you very much for your kind offer of help, and am not incidentally glad to learn of the fund's replenishment. You are right about poor dear Mary, though I can't understand why she is more allergenic than Toto, at least for me. I've found Mudgean ranks about where Toto does on my allergy scale, at least for evening visits, and so am bold to try living at the Katzers as a start, at any rate. I am trying to regain my childhood immunity while here at David's; he has a wonderful ginger kitten who is irresistable. A day and a half have left me optimistic.

David returns your greeting, and wishes he too could come. How glad I shall be to see you! I'll phone you the first moment I can.

Love, Carolyn

23.VIII.78

23.01

On CGK's duplicates
of Corinth

✓ "Find" on card, item, Are the folders as cards we know now?

Find the list of notes (taking class, etc.) made in Corinth, & to mark in index, duplicate

✓ Find CGK's concordance

(still 23.VIII)

She is inserting some omissions that she could supply onto (from knowledge of the field, she could find them in the 3 x 5 file). But this means there were no rubbings. She has noted that fact, now, wherever it is the case. Why no rubbings? There must have been somewhere else where the rubbings were being made.

— —

She has now gone, having a great deal to do elsewhere before she can leave, 25.VIII. She got through considerably less than half of the duplicates to be made. We are still 4 years behind in Corinth duplicates. But what has been done is in order. The great

23.02

majority of the BAOL are Lorraine. The first Ruskin, she has left out, as there was not time for her to learn to look them up.

I have asked her to plan to do this job when she first gets to Grace, next term. She did not promise, but I hope will do it. (A business trip to Edmonton etc. will come first.)

I may see her briefly tomorrow, so add here anything else to check.

Note she has returned the card file of stamps and taken the photocopies. These she is posting to Baltimore. She has not returned the file of jars, either A or B. I suggested getting another set of photocopies of the backs of the stamp cards, so she could combine fronts & backs into cards. See if something better cannot be found to do, cf. our photocopies of Mrs Lake's cards.

check with her:

impression that file cards exist for most or all of the Lor. A-B. - the all say "file"

- probably more often, "card index"

Athens, July 13, 1978

Dear Carolyn,

Thank you for your good letter of June 27. I was disappointed that you had not yet received - forwarded - my letter of June 17 sent to Knoxville. In case it has never caught up with you, I enclose a photocopy here. I repeat my concern that you should arrange to get done this time the Corinth duplicate records, i.e. the SAH records of stamped fragments (and some unstamped) catalogued in Corinth since 1971. We have the data for these (barring the last year or two) but they have to be set out in order, and readings made, something you undertook to do, and we need this contribution.

Yes, I do expect to be in Athens next month, and eager to hear about your experiences and plans. My best greetings to David - by any chance will he be coming to Greece this time? I must say it is pretty hot here now!

Mac has just turned up after a morning in an apotheke of the N. Museum, and he needs the typewriter. So a bientot

umbc

Department of Ancient Studies
(301) 455-2103

June 27, 1978
Tuesday

Dear Miss Grace,

New letterhead! And a new typewriter to be explored, although I do not intend to blame my mistakes on it. I had thought to know my plans quite definitely by now, but in fact I can only repeat my earlier prognosis that I should be hitting Athens around the first of August, to spend three (or maybe four, depending on the flight I am able to get from London) weeks in Greece. Thus I hope to have a good ten days to spend in the Agora, tying up various ends left last year. I come with all files in my arms!! But am not certain of much beyond that. I should also take notes on whatever the Corinthians have turned up this summer, and have written Charles asking whether it would be convenient for them to have me stay there for a week or ten days beginning the tenth of August or so--depending on how much material there is. So, I can but wait for everything to sort itself out and let you know definitely as soon as I can. Is there any reason the first ten days of August would not do for my time at the Agora? In a pinch, I can be reached c/o Davidson, Croft House, Bare Lane, Ockbrook, Derbyshire during the last two weeks of July. I shall be jumping around in England, but David will hold any mail. This evening I plan to have dinner with Betsy Pemberton in Washington, and next week I'll be with Laura Siegel in New York, and while in London may connect with my sister Kristin, d.v.

All this moving around would be much harder, if the people here at UMBC weren't so splendid. I drove here (550 miles, in twelve hours) last Thursday, [22.VI] and spent all day Friday and Saturday apartment-hunting. I was successful, and should be able to move into my new home day after tomorrow. The flat is the upper floor of a very small house, and comes with minimal furniture, so I shall be established in no time. Have to buy sheets and hangars tomorrow! I am now ready to line up my courses for the fall, which I must have in order before I leave next Friday (?). Sarah Bancroft may come down this weekend, which would be splendid; I haven't seen her since December. So when I finally arrive in Athens, I should have news of various people. Most of all, I am looking forward to learning your news, first-hand! I have missed you.

7.VII, ? (or 30.VI, but Sarah is coming down this week!)

3.VII 78
Rec'd 2.VII.
Not worth while to try. Will write now, until 2nd week in July, to be received = London.
So I = to meanwhile
she acknowledged by letter
(forwarded, I hope)

Yours,

Carolyn

Athens, June 17, 1978

Dear Carolyn,

That was very good news, that you have a three-year contract at the University of Maryland, tenure-track. I don't find mention (in your letter of March 17) of what your courses are to be; possibly you did not know yet. It will be nice to live in Baltimore, which I believe is quite a cultural center apart from having given to the world the Ouija Board (in the 1890s; the name is yes in two languages, I have just read). Knoxville also has its claim to fame, see encloded clipping. More good news in that Leslie tells me he has in his office the whole of your dissertation, and that October may see the finish. That must be a great relief to you, in the midst of year-end jobs and moving. Still more good news, perhaps from Mac, that you are surely (d.v.) to be here early in August, coming by way of England and returning again to England where you read a paper, is it in September. The Katzevs tell me that Barbara Johnson is to be living in their apartment while they are in Corinth, and that perhaps you will be also, but I wonder on account of Mudgeon the cat? At 33 Plutarch we still have Mary in the guest room, and I have a gloomy feeling that she is yxxxxx your worst enemy; anyhow Mac says that room is the hottest place in Athens. I could however supply money toward your housing, from my amphora fund, which has just been refreshed. How about it?

I was glad to have the good family news in your letter written on a plane on Dec.12. I can see that what I need is your "survival mentality", with all that there is to be done. The visit with my family last summer, including my sister Emily not seen for [illegible] 30 years, was wonderful, absorbing, but I have never caught up since, what with an article for a festschrift which went very overdue, and working with Maggie on Lesbian as well as (very little) on Kean, energizing for the Thasian corpus with the two Frenchman, and wanting to get them on to a good plan of presentation, starting with as much as possible of revision needed in the files, and pushing the needed photographic processing

against too much competition (and having with the management here "very low priority"). Then there are all the clients. So the months go by, and there is still a hole in the corner of my sitting room; and until that is fixed we can't paint; and until we paint it isn't worth while to take down the curtains for washin (so awful to get them up again). I did finally go to the dentist (fearing the loss of a front tooth, but it is fixed for the time!). But not yet to the orthopedist, so I hobble and waste time.

I can't remember all the pleasant people who have asked after you, but one was certainly J. Riley, whom I met for the first time after considerable correspondence. Dr. Baker was another; he has acquired a great interest in collecting samples for testing and building up a reference series in their lab, in Berlin; he thought you might find this interesting. They have had some ~~intxrxxxxing~~ tests done on the Pergamon handles, with interesting results.

A great deal of capacity measuring going on, as I expect you know. Also from time to time we turn up some old figures, on jars in various far off places, and they increase Mac's files.

Thank you very much for my birthday message, which came very rapidly with that nice girl Cynthia Orr. I am so glad you and David D. had that good visit over Christmas with your family. I hope you and he work out something. Maggie's English husband of course has a job in Toronto, but who knows for how long.

In all three of your nice letters, there is no mention of one I wrote you to be received when you started at Tennessee. Did you ever get it? There is also no mention of two things you owe us here, and I rather need to know they are not forgotten. One is the file cards of the Corinthian class taken from our Athenian archives. I don't remember agreeing that they should go to the US, but if I did I was wrong, because these cards are records not only for the Corinthian class, but also for every site represented among the citations on the back, and they are part of our personal computer system, when we try to identify something seen before. The photocopies were a safeguard against total loss, but

it would take a lot of work to make them into a usable file; in some cases the citations are lacking. So, don't forget to bring us back those cards. The other matter, something you promised us was that you would write the duplicates of recent finds in Corinth, such a large proportion of which are Corinthian and need your special knowledge; the non-Corinthian I offered to have done here by others, but you wanted to do them yourself, and it would be a very good thing if you did; the first thing is to get the series in order, basing on rubbings and lists given us by Nancy Bookides, and deciding if some things in these lists don't belong in our records. We discussed this job, I guess a number of times, but finally in November 1976, when you undertook to do the job in the following February, after a return from the US and England. Well, many things we mean to do get postponed. They should not be ignored, though. And I think you want to get this done, this time.

It is nearly 7:00 this Saturday in Athens. And in Boston is going on a luncheon in honor of my nephew Nicholas Grace and his bride (to-be? as I can't quite figure out the hour of the actual ceremony). Yesterday Nick's mother gave them a "dinner on the lawn" at Old Farm where I stayed last summer. And in the afternoon (i.e. today but not yet) of the 17th was to be a reception, to which we were invited by the two persons involved, who of course were not yet married when they did the inviting. My nephew wrote me in the midst of the blizzard last winter, to tell me he was going to get married; the governor of Mass. had given orders to everybody to stay home, and he was happy to do it, and to write letters about the coming event, wanting me to share in his joy. Which I do, and knock on wood.

My best to those you see that I know, including David.

March 17, 1978

27.01

Dear Miss Draze,

The term is over and decisions have been made and I feel a thousand things as I report that I have accepted a position at the University of Maryland, Baltimore County. This is a three-year contract for a tenure-track job, the place now held by Nina Zonk. She leaves in the spring to get married, and K.D. (Vitelli-plus whatever her new name is) will be on leave during the coming year in Indiana, so the archaeology wing of the Ancient Studies program will be completely reshaped in the near future. I am quite excited about living in Baltimore, and will go there when classes end here in June to look for an apartment. The Maryland job will leave me the most opportunity to work on amphoras, both in America and in Greece, and so perhaps it is just as well that I did not get the Michigan job, which went to someone named Margaret Cool Root. Still, I had a good interview up there, although lack of Ph.D. and publications did me in. I am about to remedy both lacks!

I am still producing the final pieces of the dissertation for Mr. Shear, and it looks as though April 1 will see the real end of it. I have not yet received any part of it back from him, although he says it looks fine. I am still hoping to defend in late May, as is Sarah. (No word on the job situation from her, although we're in touch.)

Classes start again a week from Wednesday, so I have to be very quick. Both the Latin and the Greek archaeology last quarter went well, especially the latter, and I am looking forward to teaching Hellenistic and Roman archaeology and sanctuaries of the Greek and Roman world (emphasis upon the former!) this term. I shall have fewer class hours this spring, which is a good thing given the upcoming Dissertation Push.

It is rather nice to sit home and work for ten days, even though the birds, greening hills, and sunshine are enticing. We have had such a winter, even down south, that I hardly feel I dare take off my snow tires! For a while the pattern seemed to be snow every Tuesday and Thursday.

I still do not know for sure when and if I can come to Greece this summer. I must wait on my tax returns and on various other financial questions, as I am not eligible for any fellowships. I very much want to come, I hardly need say, and so perhaps somehow I can work things out. The minute I do know anything definite, I shall let you know.

I hope all goes well with you. I take it that things are busy at any rate! Please give my greetings to Maria (whom I owe a letter) and to Andreas, and to Helen Beri. Alas, but I am making some progress with my correspondence.

Thinking of you often,

yours,

Carolyn

Carolyn G. Koehler
3636 Taliluna Ave., Apt. 203
Knoxville, TN 37919 U.S.A.

KNOXVILLE, TN
PM
20 MAR
1978

27.03a

Miss Virginia R. Grace
American School of Classical Studies
Souidias 54
Athens 140
GREECE

AIR MAIL

27.036

AIR MAIL

January 6, 1978 28.01

Dear Miss Bruce,

I have found someone to carry this right to you, an underwater archaeologist-in-training named Cynthia Orr, whom I have met here at the Conference on Underwater Archaeology in San Antonio. Cynthia said she once telephoned you about cats, and wanted to meet you, and as I like what I've seen of her here very much, I'm delighted she can deliver my birthday greetings. (She is a member of the College Year in Athens)

So much has happened since the plane ride home during which I wrote you; late December is always a turning-point. My English friend David Davidson flew over for Christmas, and after spending a few days on Vancouver Island just after he landed, we spent the rest of the holiday with my family. Very happy it was, too, although so short. Job prospects in England are very slim for any archaeologist at present, let alone an American, and so I am looking full-steam on this continent for a real position. What will happen to this transatlantic relationship I don't know, but as all the jobs I'm up for are a minimum three-year contract, I have no choice but to hope rather vaguely that we can still work something out eventually.

I was quite lucky to have several interviews at the Atlanta meetings, and feel I have a good chance at the Michigan and Indiana jobs. Kathy Wright is also up for Michigan; I hardly need say the competition on all fronts is stiff. Of course I don't talk about the whole business except to Mr. Shear, but I wanted to let you know I am at least moderately optimistic that something will come through. I also had a good interview with Oberlin.

It was of course very good to see old friends at the meetings, from both sides of the Atlantic. I shared a room with Sarah, and had a most pleasant evening with Mac. The whirl was considerable, and I hurried back to Tennessee for 3 days to line up the coming week's trip and the winter term's classes. Here I read a paper, essentially the same one I gave at Lipari, and so the university covered my expenses. Several AIA members and excavators have showed me material from the Lipari wreck, and other amphoras as well, and I've been able to explain our system of rubbing, photographing, and profiling to several of the Texas A+M students. Tomorrow I head for Knoxville and my two elementary classes in Latin plus a course in Greek archaeology (of the 6th to 4th cens.)

Mr. Shear has not handed back any part

of my dissertation yet, but says he will soon and that it looks good. I STILL have a chapter and the appendices to write, but am actually producing bits here and there. I am now scheduled to defend in the spring.

Whether or not I come to Greece this summer depends upon my financial situation. If I have a job, I'll come even if I don't have the money; otherwise, I shall have to remain in Knoxville and teach summer school. The minute I hear anything about anything, I'll let you know! In the meantime, I hope all is going well for you. I miss you, and think of you often.

Love,

Carolyn

28,04

received 1st Feb 78
Cynthia Orr
(was visited us
numerous times
recently)

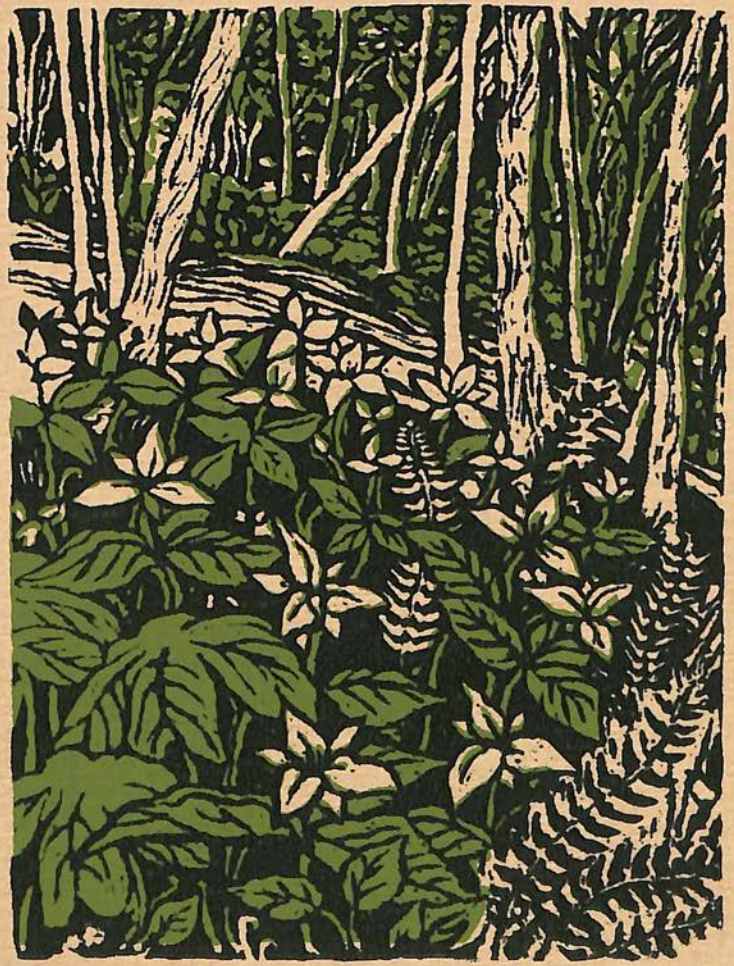
Miss Virginia Grace
33 Plantation

kindness of Cynthia Orr

All good thoughts
and best wishes
come your way for Monday:
Happy Birthday,
a good year,
and further returns of the same!
with my love,

Carolyn

28.056



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[29.01] December 12, 1977 NORTHWEST FLIGHT 71

Dear Miss Grace,

I am surfacing for the first time since — well, I'm hard put to pinpoint a moment I didn't feel inundated. I am at a loss to explain my silence on all fronts, but at least in your case I know exactly where to begin, and that is with a heartfelt thank-you for that most lovely blue dress. I treasure it, and hope to wear it during the holidays at home. The alteration was masterfully done, and I feel very elegant indeed in it. Never otherwise could I have had such a dress. I had the green one altered as well, and will look forward to wearing it this summer.

The last few weeks in Athens were quite horrendous, as I tried to get everything accomplished. That plus the re-entry into America forced a retreat fairly deep within, but I have successfully come through my first term's classes and can abandon the survival mentality which got me through. By the end of the quarter I could generally relax and lecture spontaneously (I don't mean without notes), and really began to enjoy teaching. The two courses I've just finished were Minoan and Mycenaean archaeology, and Greek and Roman Cities; next term I do classical Greek archaeology and elementary Latin. I am still struggling with odds and ends on my dissertation, but the end must come, and soon. I kept hoping I could write you and say, all finished, but the sad result

has been that I haven't written at all. You have been very often in my thoughts, and as I manage to integrate my existence better in the near future, I hope I can give more tangible evidence of this.

The future of course remains up in the air, and depends largely upon the job situation. There were fewer jobs open this year for archaeologists than expected, but I've written off to Michigan, Case Western Reserve (a postdoctoral fellowship), Indiana, and the University of California at Davis, as well as a few others. I shall leave my family December 27th and fly to Atlanta, where of course the job search will be in full swing. There I shall share a room with Sarah, whom I haven't seen for a year. I shall also have a conference with Ur-Shkar in Atlanta, and will then know better where I stand, as he will hand back the parts of the diss. he's read.

Needless to say, I am looking forward tremendously to Christmas at home for the first time in six years. In August we gave Mary Ruth a proper wedding, but amid all the bustle I hardly had time to sort the rest of my family out. Kristin (the youngest) drove with me across the country to Knoxville in my grandmother's 1960 Valiant, and then went on to Germany where she is an au pair girl for a family in Hagen (near Cologne, I think). I still marvel that all the wedding festivities went so

smoothly, and that our house held four extra people with sixteen for dinner one evening. My parents are well, but my father's parents' health has deteriorated to the point that they could not spend another winter on the farm in Missouri. My father flew down shortly after Kristen and I visited them early in September, and brought them out to live in Pullman where my folks can help them. So we shall be a good crew for the holiday.

We are now flying into Great Falls, Montana, after spending an hour in Billings; I also stopped in Lexington, Ky. and Cleveland (I think) before changing planes in Chicago. I'd rather see America on a Greyhound! But it will be good to get home again – I hardly need add.

I hope your holidays are happy. I keep thinking of your wonderful mulled wine. For many reasons besides that, I miss you very much.

Love,

Carolyn

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Corinth and Corfu: A Neutron Activation Study of their Pottery

MARIE FARNSWORTH, I. PERLMAN,
AND FRANK ASARO

Abstract

Neutron activation was used to analyze pottery from Corinth and Corfu. Fine painted pottery from Corinth was shown to be surprisingly constant in composition over several hundred years. The clays closest to the clay used in the ancient pottery were found near the Potters' Quarter and in the neighborhood of the Tile Works, 1.9 miles distant. It was definitely established that Corinthian type pottery was manufactured in Corfu; the Corinthian type pottery from Aegina which was analyzed had been manufactured in Corinth. Undecorated pottery of light colored clay was manufactured in both Corinth and Corfu. Jars with the Corfu coin insignia were all of Corfu manufacture. Certain of the undecorated jars from Corinth (some untempered and some tempered with hornfels) matched the fine painted ware, but the undecorated ware showed considerably more variation in analysis than the fine painted ware. It seems that the manufacture of fine painted pottery was closely controlled in Corinth, but possibly the undecorated ware was manufactured locally somewhat as it is today in Aegina.

In 1970 one of us published a paper dealing principally with the undecorated wares and clays of Corinth and Corfu.[1] An attempt was made to analyze amphoras and other large pots mineralogically, but this was to a large extent unsuccessful on account of the lack of distinctive inclusions; pottery made from the light clays of Corinth and Corfu is very similar in appearance as are thin sections made from such pottery. No attempt was made to study the finer painted wares where mineralogical analysis is even more unsuitable. Spectrographic analysis of the coarser ware (unpublished) was also unsuccessful. In the meantime, the superiority of neutron activation as a method of analysis had been demonstrated,[2] and the present paper is the result of a cooperative effort by the three authors.

Archaeological Introduction. Several archaeological problems arise from the fact that the light-colored clays of Corinth and Corfu are very similar, so that it is often difficult to determine which city produced certain pieces or groups of pottery with a close stylistic resemblance. Furthermore, the political and economic connections between Corinth and her colony of Corfu (ancient Kerkyra) resulted in the free and continual exchange of products and of such techniques as the manufacture of pottery, an industry in which Corinth excelled. Certainly the Corcyreans made their own imitations of Corinthian fine painted wares[3] and imported large amounts of Corinthian pottery as well.

Attributing similar coarsewares to either Corinth or Corfu is still more difficult, because decoration is less indicative and fabrics less closely standardized than with fine pottery. Only recently has the problem been clearly defined in the case of the large pointed amphoras used for transporting and storing wine and oil. Two series of such jars, one definitely made in Corinth and the other attributed to both Corinth and Corfu, are included in the coarseware samples analyzed in this study. Since, however, samples were collected before complete archaeological information was available, it is not feasible to separate the two amphora types for purposes of this discussion. The following brief introduction to both types provides a background for this report and for subsequent research.[4]

[1] M. Farnsworth, "Corinthian Pottery: Technical Studies," *AJA* 74 (1970) 9-20, pls. 1 and 2.

[2] I. Perlman and F. Asaro, "Deduction of Provenience of Pottery from Trace Element Analysis," *Univ. Calif. Radiation Laboratory* 17937 (1967).

[3] G. Dontas, "Local Imitation of a Corinthian Vase of the Later Seventh Century B.C. Found in Corfu," *Hesperia* 37 (1968) 331-37, pl. 100.

[4] The problem was originally stated in Grace *apud* Boulter, "Pottery of the Mid-Fifth Century From a Well in the Athenian Agora," *Hesperia* 22 (1953) 108-109, under no. 166. For illustration of Corinthian amphora Types A and B about 300 B.C. (the stage contemporary with the Corinthian B handles stamped with a star), see H.S. Robinson, "A Sanctuary and Cemetery in Western Corinth," *Hesperia* 38 (1969) 9-13; pl. 2, no. 2 (Type A) and nos. 3 and 9 (Type B; the toe on no. 3 is restored as longer than it should be).

In both style and fabric, the first type of transport amphora resembles other coarseware pottery made in Corinth, so that this series is known as Corinthian Type A. These jars are nearly always tempered with hornfels, a red mudstone visible in numerous outcroppings on Acrocorinth. Only at certain stages during the production of this class, which spanned the period from the seventh through the third centuries B.C., was the beige Corinthian clay which is being considered here used. More characteristic is a red clay also used for other Corinthian coarsewares, without the temper necessary for strengthening larger vessels. (In its finer version, this fabric is called blisterware because of the pockmarks produced on the surface during firing.) Jars as well as other products such as roof tiles tempered with hornfels seem to be typical only of Corinth.

Since large numbers of the second and more problematical class of transport amphoras have been excavated in Corinth, such jars are currently termed Corinthian Type B. Their characteristic clay is again light-colored, firing beige, pink, cream, or greenish according to the temperature; in texture it is rather fine and porous. Very different in shape from Type A, this series was manufactured throughout approximately the same period. Often one handle of an amphora is stamped with a monogram or device, one example being the star with six, seven, or eight rays discussed below. It appears that the jars of this type should all be assigned to the same center of production, since no stylistic distinction is discernible between those found in Corinth, Corfu, Athens, or farther abroad. Analyses presented here, however, along with other archaeological evidence, indicate that at least some of these jars came from Corfu, while others came from Corinth. More extensive analyses like those carried out on the fine wares of Corinth and Corfu will be needed before final conclusions can be reached about the provenience and extent of commercial exchange of these numerous coarseware containers.

I. *Fine Painted Corinthian Ware, Painted and Plain Corfu Ware, Corinthian Jars, Corinthian Ware from Aegina (Table I).*

The first reference group to be employed is Corinthian ware excavated at Corinth (see Table I; also Concordance IA). Attention is called to the fourth column in Table I which concerns a group of 40 specimens of fine Corinthian ware dating from the seventh-third centuries. In all, 41 pieces were analyzed, but one of these (CRTH 39) was removed because it was systematically low in all elements. Such behavior can usually be ascribed to dilution by some sterile material, in this case $CaCO_3$, which was unusually high in this piece.

The numbers shown for each element are the *mean value* for the group of 40 and the *standard deviation* (σ) from the mean. When the data were tabulated according to time period, there was little to distinguish any one of these sub-groups from the others. Since the time span encompassed was over four centuries, this would indicate that either the same clay source was used over this long period or that clays in the general area are indistinguishable. In either case, the data of Column 4 should afford a reasonably secure view of the chemical profile for fine wares made at Corinth. The elemental abundances are in parts per million unless a % sign occurs after the chemical symbols in which case the abundances are in percent.

Before going on to examine these and other data, a discussion of statistics is presented in order to show that we will have no completely satisfactory way of determining provenience by blindly applying statistical methods.

First, a note on statistics. The standard deviation for each element in the group tells something of the spread in values encountered for that element. For the element iron in Column 4 (5.32 ± 0.28), it is seen that σ is only about 5% of the mean value. If iron in this group followed a normal statistical distribution, the values for ⅔ of the sherds would lie within $\pm 1\sigma$ of the mean value, and only 1 in 20 should lie outside of $\pm 2\sigma$. Thus, for a group of 40 sherds, about 27 should deviate by less than $\pm 1\sigma$, 11 should lie between $1\text{-}2\sigma$, and 2 should be not far beyond $\pm 2\sigma$. The actual distribution for iron among these 40 sherds shows 30 sherds, 9, and 1. This is very good agreement for a group of 40 samples.

In contrast to the behavior of iron, we can examine that for uranium (2.56 ± 0.65) which shows a spread of about 25% from the mean value. Furthermore, the distribution among the 40 sherds is 37-0-3 in contrast to a normal distribution of 27-11-2.

Table I. Corinthian ware, Corfu ware, Corinthian jars, Corinthian ware from Aegina

	(1) Fine Painted Corfu (5 pieces)	(2) Plain Corfu (21 pieces)	(3) Fine Painted Corfu (9 pieces)	(4) Corinthian 7-3 cent. Fine painted (40 pieces)	(5) Corinthian Jars (6 pieces)	(6) Aegina Corinthian (26 pieces)
Fe (%)	5.24 ± 0.18	5.04 ± 0.41	6.23 ± 0.29	5.32 ± 0.28	5.13 ± 0.30	5.66 ± 0.21
Ta	0.783 ± 0.082	0.826 ± 0.076	0.930 ± 0.128	0.810 ± 0.099	0.832 ± 0.049	0.822 ± 0.025
Sc	19.51 ± 1.15	17.97 ± 1.56	24.69 ± 1.30	20.68 ± 1.09	20.10 ± 1.09	21.82 ± 0.82
Co	29.9 ± 3.9	27.3 ± 2.7	31.4 ± 3.5	28.59 ± 2.67	26.82 ± 2.36	30.11 ± 2.29
Cs	2.1 ± 1.0	1.3 ± 0.9	3.8 ± 2.6	9.6 ± 2.1	9.8 ± 1.3	9.2 ± 0.7
Cr	471 ± 36	526 ± 32	280 ± 16	234 ± 17	228 ± 27	247 ± 15
Hf	3.93 ± 0.41	4.27 ± 0.46	3.97 ± 0.49	3.52 ± 0.31	3.22 ± 0.47	3.48 ± 0.19
Th	9.65 ± 0.47	9.96 ± 1.03	12.84 ± 0.73	10.84 ± 0.62	10.38 ± 0.78	11.21 ± 0.35
Ni	337 ± 12	328 ± 38	242 ± 27	210 ± 26	207 ± 38	223 ± 26
Rb	69 ± 14	42 ± 10	58 ± 24	143 ± 23	143 ± 12	166 ± 27
La	28.8 ± 1.3	27.4 ± 2.5	37.5 ± 1.7	31.0 ± 2.3	29.9 ± 1.6	32.2 ± 1.1
Lu	0.385 ± 0.027	0.389 ± 0.036	0.432 ± 0.020	0.366 ± 0.018	0.353 ± 0.014	0.376 ± 0.017
U	1.68 ± 0.31	1.71 ± 0.29	2.29 ± 0.57	2.56 ± 0.65	2.27 ± 0.12	2.51 ± 0.14
Ti(%)	0.438 ± 0.031	0.438 ± 0.047	0.557 ± 0.044	0.464 ± 0.035	0.453 ± 0.036	0.433 ± 0.025
Mn	1014 ± 255	954 ± 235	1042 ± 139	881 ± 97	929 ± 93	913 ± 76
Na (%)	0.664 ± 0.104	0.597 ± 0.139	0.519 ± 0.410	0.696 ± 0.279	0.539 ± 0.078	0.686 ± 0.210
Al (%)	*	*		8.23 ± 0.45**	7.31 ± 0.65	8.54 ± 0.39
Ca (%)	8.5 ± 1.1	7.0 ± 1.7	8.8 ± 1.1	10.0 ± 2.1	9.9 ± 1.3	11.2 ± 1.3

* Not analyzed for Al.
** Only 5 pieces analyzed for Al.

Column 1 —— 5 pieces: CFU 5, 6, 8-10
Column 2 —— 21 pieces: CFU 18-43 (except 29, 30, 32, 33, 36)
Column 3 —— 9 pieces: CFU 1-4, 7, 11-14
Column 4 —— 40 pieces: CRTH 1-11, 15-24, 25-31, 40-42, 32-38, 43, 44
Column 5 —— 6 pieces: CRTH 45-48, 56, 57
Column 6 —— 26 pieces: AEG 6, 10-15, 17-24, 28-36, 38-39

The reason for the skewness (and the large value for σ) is that four sherds had much larger uranium values than the others. If we re-compute the group values for the remaining thirty-six sherds we find 2.34 ± 0.28 (compare with 2.56 ± 0.65). The significant aspect is that σ has become much smaller in this group of thirty-six sherds, and the distribution is now much closer to what one would expect for a normal distribution but still somewhat skew. The four sherds which were removed now deviate by about 7σ from the group of thirty-six. As far as uranium is concerned, these four pieces clearly do not belong in the group. However, if we look at all of the other elements, there is nothing exceptional about these four sherds and we lack any verifiable explanation as to why the uranium values are high.

The objective of forming a chemical pottery group is to see whether other vessels are or are not members of the group, hence do or do not have a common provenience. Bearing in mind uncertainties of interpretation as exemplified by uranium, we have a couple of options as to how we analyze the data. If we include all forty sherds in the group, it is relatively easy for another sherd to be a member of the group as far as uranium is concerned because of the large value for σ. Stated differently, it is more difficult to show that a sherd *could not* have come from Corinth, based on uranium alone. The other option is to take the more restrictive group of thirty-six, in which case it becomes easier for a sherd "not to come from Corinth."

The practical argument against this approach is that there are a number of plausible reasons why the distribution could be skewed, rather than normal, which are not related to questions of provenience, and it is better not to make sub-groups based on a particular element in the absence of other compelling information. Consequently for this case, we prefer to include all forty sherds, realizing that we are going to get less information than we would like from uranium on questions of provenience.

The use of many elements for judging matters of provenience has great advantages over employing just a few. If certain ones (such as uranium in the Corinth group) prove ill behaved, there are still an adequate number of others to make delicate distinctions. It is also generally found that two sources of clay will have a number of elements for which the levels are indistinguishable even though their spreads are fairly small. If these happen to be the only ones measured, grave errors can be made in assigning provenience.

Out of the larger number of elements measured, we have selected 18 for diagnostic purposes. These were chosen in the first instance because they might exhibit different chemical properties during clay formation and then, pragmatically, they seem to be more or less independent of each other in their variations among different sources. Elements which follow each other proportionately from clay to clay cannot give more information than can be gotten from only one of these elements.

Under the assumption that the eighteen diagnostic elements can be treated as independent variables, the statistical analysis is straightforward. In comparing a single sherd with a group, twelve elements should lie within 1σ, five should lie between $1\text{-}2\sigma$, and one should be not far beyond 2σ, if the sherd is to be accepted as a member of the reference group. One should also be able to compute the odds that the sherd does not belong to the reference group by compounding the odds for the individual elements. The so-called "96% confidence level" usually refers to a single variable whose value lies at 2σ from the reference group. This means that, based on this single variable, it is 96% certain that that member does not belong to the reference population. If we have 18 *independent* variables, a member of a group will have one of its variables at 2σ, but the root-mean-square of all σ's will be about 0.67σ, indicating 1:1 odds. However, if there are very many variables which lie beyond 2σ or only a couple at 3σ, the odds rapidly become very large. For example, with eighteen elements which follow a normal distribution except that two elements lie at 3σ, the odds that this sherd does not belong to the reference group is about 10^{10} to 1.

After all of this has been said, we believe that it can be hazardous to judge matters of provenience by the blind application of statistics. We usually can only guess that we have an adequate sampling of pottery to establish reference groups and must allow for the possibility that pottery which was exported was not from the exact sources as the particular reference materials employed. There is also

some evidence that our diagnostic elements cannot be treated strictly as independent variables. The net result is that we do pay attention to statistics but temper what is said about provenience by taking into account all that we have learned from all analyses made on pottery which could possibly have some bearing on the problem at hand. It is this latter aspect of data interpretation which proves difficult and time-consuming. It also can involve arguments which are more subjective than we would like.

Returning to Table I, we compare the group of fine Corinthian ware with five other groups of pottery. Columns 1 and 2 pertain to a group of 5 and 21 sherds excavated on Corfu which, for the present, we assume were made there. Chemically, they are virtually indistinguishable and have been segregated on stylistic grounds partially in order to emphasize that fine painted wares and the large undecorated vessels likely come from the identical clay source. It should be kept in mind that even if it were known for sure that this group was of Corfu manufacture, it does not follow that other pottery was not made on Corfu with other compositions. The data of columns 1, 2 compared with 4 merely show that a number of elements are the same in these two pottery groups (Corinthian and Corfu) but that a few are grossly different (see, for example, Cs, Cr, Ni). If individual sherds (data not shown) from one of these groups are compared with the group profile for the other group, it is found that there is a huge statistical difference. In other words, each group will not accommodate members of the other, i.e., the sherds listed in columns 1 and 2, Table I, were not made in Corinth. For descriptions of these sherds, see Concordances IB and IIB.

The fifth column of Table I pertains to a group of six Corinthian jars. Four of these have a rather fine paste, and the other two are tempered with hornfels, but all showed a similar composition which was indistinguishable from that of the fine Corinthian ware of column 4. By our criteria these particular Corinthian jars came from the same clay source as the large group of fine decorated ware. For other Corinthian jars, see infra.

The last column of Table I pertains to a group of 26 Corinthian sherds from Aegina. These are indistinguishable from the Corinthian ware excavated at Corinth and may be interpreted as imports to Aegina.

That the sherds of column 6, Table I, are not of Aeginetan manufacture is also supported by the analysis of clays from Aegina. All the clays were collected from potters at the sites mentioned. These were as follows:

AEG1 mixed clay from Misagros (2 coarse: 1 fine)
2 Misagros coarse
3 Misagros fine
4 Hagia Marina
5 Souvala

Of the five fired tiles (AEG1-5), four made up a very compact group and differed from the pottery collected in Aegina in fourteen out of eighteen elements, some grossly different. AEG3 was different from the four others in minor respects. There is no way that the pottery could have been made from the clays. Data are not shown for these clays from Aegina because they do not relate chemically with any of the pottery discussed in this paper.

In all, 31 samples (see Concordance IC) from Aegina were analyzed: AEG6-24, 28-39. Twenty-six of these samples (AEG6-24, 28-39 less 7-9, 16, and 37) made up a compact group which was indistinguishable from the fine Corinthian ware. The five omitted specimens, AEG7, 8, 9, 16, 37, had only minor differences. While it must be pointed out that our sampling was rather restricted, our analytical data makes it improbable that pottery of this type was made in Aegina during the seventh and sixth centuries B.C.

The substance of the displays in columns 4, 5, 6 is that these three groups which differ either in style or place where found can all be related to Corinth as the place of manufacture. As such, these serve as reference groups for deciding whether other pieces of similar wares come from Corinth.

The groups from Corfu (columns 1, 2, 3) are set down to contrast with Corinthian wares and for comparisons to be made later.

Corinthian Clays. To the casual observer Corinth has an unlimited supply of clays. Payne says: ". . . the fine pale clay of which Corinthian vases are made is a distinctive feature of the landscape in the neighborhood of Corinth; it marks the country westward, toward Sicyon, and south along the

gorges which run down to the coast of the Corinthian gulf from the watershed at Nemea. The several industries which depend upon a supply of fine clay must have been greatly facilitated by this abundant supply of raw material."[5] That there is an abundant supply of raw material in Corinth is, we believe, the opinion of some archaeologists today, but that is, indeed, far from the truth. What one sees is marl, an intimate mixture of lime and clay, entirely unsuitable for making pottery since, on the first damp day, it would distintegrate.

A number of attempts have been made to find the clay used by the ancient Corinthian potters. The search is complicated by the fact that the surface layer is often 8-10 feet higher today[6] than it was in classical times and by the fact that underneath and along this surface layer one usually finds marl and not useable clay. In the winter of 1971 seventeen samples of clay in the neighborhood of ancient Corinth and one from Solomos were collected. The majority of these were not useable (too high in lime), but two were of interest. One of these, which was found on the west bank of the ravine below the Potters' Quarter, is 1.9 miles from the clay bed that lies east of the Tile Works where the second sample was collected. The location of these two clay beds can be found on the Corinth maps[7] as follows: (CRTH 85) clay bed on slope west of Potters' Quarter: Sheet 7, grid D-18/e 10; (CRTH 84) clay bed east of Tile Works: Sheet 5, grid Q-12/b 2-3. The first was from a well-boring, and the second was under six feet or so of marl in a new road cutting. These two clays which have about 20% calcium agree chemically. While they have unmistakable similarities to Corinthian pottery, it proved impossible to relate them in any way that could be used to make fine distinctions in provenience. Solomos clay is quite different in manganese, uranium, rubidium, nickel, and chromium and somewhat different in lanthanum and scandium from the two Corinthian samples.

Professor B. von Freyberg of the Geological Institute of the Erlangen-Nürenberg University has studied the geology of Corinth over a long life,[8] and one day was spent with him visiting various sites around Corinth. Briefly, he explains that in Pliocene times there was a large lake where the Peloponnesus now is. Through weathering, the rocks in the mountains surrounding this lake disintegrated, and the disintegration products, in solution and suspended, swirled around in the lake, settled, and formed a new sediment, Corinthian marl. The ratio of clay to lime varied in these deposits. From the analysis of ancient fine ware (see supra), we can conclude that there was a deposit of marly clay with about 10% calcium and other impurities that extended well down into the Peloponnesus. The larger lime content in the clay we found may be caused by a later deposit of lime or we may not have found the clay lowest in lime. The ability of ancient Corinthian potters to select clay suitable for fine ware is impressive. The sedimentary deposit must have varied, and yet the potters seem to have been very skillful in selecting the best for their decorated ware and leaving the less good clay for undecorated ware.[9]

We do not know how the ancient Corinthians selected and prepared their clay. Corinthian clay is exceptionally fine, and it does not contain large amounts of coarse inclusions such as one finds in the red and white clays of Athens. Most of the lime and clay in Corinthian clay have approximately the same particle size. Since the specific gravity of calcium carbonate (calcite) is 2.93 and that of clay (variable) only slightly less, it would be virtually impossible to separate these two constituents by settling. From the similarity of the analyses of fine painted ware over a long period of time we can only assume that the clay used for this pottery was carefully selected and prepared. The differences in analyses of some of the plain ware indicate that less carefully selected and prepared clays were often used for such pottery. This conclusion is also supported by mineralogical analysis.[10]

Since we are dealing in this study with both tempered and untempered pottery, it is of some interest to know whether the temper itself (hornfels) could change the composition of trace elements suffi-

[5] H. Payne, *Necrocorinthia: A Study of Corinthian Art in the Archaic Period* (Oxford 1931) 181-82.

[6] Private communication from Dr. B. von Freyberg, Geological Institute, Erlangen-Nürenberg University.

[7] Maps made for the American School of Classical Studies by the Topographical Service of the Greek Ministry of Public Works (scale 1/2000).

[8] B. von Freyberg, "Der Bau des Isthmus von Korinth," *Annales géologiques des pays helléniques* I[8] Serie T. IV (1952) 155-88.

[9] M. Farnsworth, "Greek Pottery: A Mineralogical Study," *AJA* 68 (1964) pl. 68, figs. 14 and 15.

[10] Farnsworth (supra n. 9) 221-28.

ciently to complicate provenience deductions. There is an abundant supply of hornfels near the first gate of Acrocorinth and a sample of this was analyzed. It was found that the levels of none of the trace elements differed wildly from those of the fine Corinthian ware. One could calculate that if hornfels were added to the clay to the extent of 15%, the composition of the pottery would still be so close to that of the fine ware that it could clearly be recognized as Corinthian pottery.

II. *Corfu ware: Fine Painted Ware, Amphoras and Other Large Jars, Stamped Amphora Handles and Reference Materials (Tables II and III).*

The purpose of the display in Table II is to discuss further the fine and plain wares (columns 1 and 2 in Table I; column 4 in Table II) tentatively described as of Corfu manufacture as well as six amphora handles stamped with rosettes and to show that all are very likely from Corfu.[11] The fine and plain wares in columns 1 and 2 in Table I are not exactly alike but are very similar. They are listed together in column 4 in Table II. Column 3 in Table I is not repeated in Table II. It is, however, discussed below. The analysis of only one of these stamped amphora handles agrees in detail with the Corfu reference group in column 4; therefore other reference materials are considered.

The first column of Table II pertains to a group of 9 Roman sherds (Concordance III) from Corfu whose composition is very much like that of the earlier fine and plain ware from Corfu except that cesium (Cs) and rubidium (Rb) are considerably higher. (The group of 26 Corfu sherds from

Table II. Corfu stamped handles and reference materials

	(1) Roman Ware Corfu (9 pieces)	(2) Modern Corfu (1 piece)	(3) Stamped Jars Corfu, Athens, Corinth (5 pieces)	(4) Corfu pots in Col. 1&2 Table I (26 pieces)	(5) Stamped Jar Corinth (1 piece)	(6) Roman Ware Corfu (1 piece)
Fe (%)	4.78 ± 0.32	4.35	4.58 ± 0.41	5.08 ± 0.39	5.04	4.90
Ta	0.762 ± 0.063	0.610	0.737 ± 0.048	0.818 ± 0.077	0.814	0.762
Sc	17.81 ± 1.48	16.38	16.60 ± 0.89	18.26 ± 1.60	17.82	18.39
Co	29.16 ± 2.92	28.18	27.49 ± 0.27	27.83 ± 3.03	29.01	29.28
Cs	5.5 ± 0.7	4.8	5.4 ± 0.9	1.4 ± 0.9	1.3	1.7
Cr	457 ± 54	448	493 ± 29	516 ± 39	596	538
Hf	3.84 ± 0.36	3.58	3.54 ± 0.39	4.24 ± 0.44	3.76	4.07
Th	8.98 ± 0.64	8.95	8.45 ± 0.60	9.90 ± 0.95	9.63	10.34
Ni	299 ± 31	324	298 ± 31	333 ± 32	320	335
Rb	138 ± 26	115	123 ± 27	48 ± 15	55	41
La	26.8 ± 2.2	24.2	26.7 ± 4.3	27.7 ± 2.4	29.0	27.7
Lu	0.350 ± 0.046	0.319	0.344 ± 0.047	0.397 ± 0.038	0.376	0.372
U	2.09 ± 0.11	2.20	2.06 ± 0.08	1.70 ± 0.29	1.83	1.56
Ti (%)	0.378 ± 0.027	0.386	0.372 ± 0.046	0.438 ± 0.044	0.421	0.419
Mn	897 ± 156	733	814 ± 70	966 ± 235	943	1029
Na (%)	0.874 ± 0.195	1.094	0.949 ± 0.074	0.611 ± 0.133	0.608	0.618
Al (%)	6.56 ± 0.48	—	6.16 ± 0.26*	—	6.33	—
Ca (%)	8.8 ± 1.7	11.0	8.3 ± 1.5	7.3 ± 1.7	7.9	8.4

* No Al value for the jar from the Athenian Agora.

Column 1 —— 9 pieces: CFU 55, 56, 59, 61, 63, 64, 69-71
Column 2 —— 1 piece: CFU 17
Column 3 —— 5 pieces: CFU 53, 54; CRTH 79, 80, ATAG 1
Column 4 —— (see columns 1 and 2, Table I)
Column 5 —— 1 piece: CRTH 81
Column 6 —— 1 piece: CFU 16

[11] The rosette stamp on the amphora handles, which also occurs on Corfu coins, is illustrated in Farnsworth (supra n. 1) pl. 1, no. 5.

Table I, columns 1 and 2, is repeated as the fourth column in Table II.) Some evidence that this composition also represents Corfu provenience comes from the finding that a sherd of modern Corfu pottery fits well enough in this group of Roman ware. The data for this modern sherd (CFU 17) are entered as the second column in Table II.

The third column is a group of 5 stamped handles (Concordance IIA): 2 excavated at Corfu (CFU 53, 54); 2 excavated at Corinth (CRTH 79, 80); and 1 from the Athenian Agora (ATAG 1).

In summary, we have concluded that we have two closely similar chemical groups to serve as reference materials for Corfu provenience: one of these is a group of 26 plain and decorated wares; the other is a group of 9 pieces of Roman ware. The Roman wares fit in composition a piece of modern pottery from Corfu, thus providing added evidence that these wares were made on Corfu. An additional single piece of Roman fits in composition the group of 26 plain and decorated wares. As for the stamped handles discussed here, one of

Table III. Corfu Sherds from the Athenian Agora and reference

	(1) (5 pieces)	(2) (1 piece)	(3) (1 piece)	(4) (1 piece)
Fe (%)	4.58 ± 0.41	4.37	5.22	4.73
Ta	0.737 ± 0.048	0.712	0.829	0.721
Sc	16.60 ± 0.89	16.23	19.65	18.73
Co	27.49 ± 0.27	27.22	28.09	22.34
Cs	5.4 ± 0.9	5.7	6.3	7.4
Cr	493 ± 29	505	385	375
Hf	3.54 ± 0.39	4.25	3.87	3.92
Th	8.45 ± 0.60	8.26	9.30	9.10
Ni	298 ± 31	277	284	244
Rb	123 ± 27	103	136	155
La	26.7 ± 4.3	23.8	24.9	25.1
Lu	0.344 ± 0.047	0.329	0.347	0.329
U	2.06 ± 0.08	2.12	1.56	2.38
Ti (%)	0.372 ± 0.046	0.358	0.433	0.441
Mn	814 ± 70	750	801	551
Na (%)	0.949 ± 0.074	0.961	0.949	0.900
Al (%)	6.16 ± 0.26	6.51	—	—
Ca (%)	8.3 ± 1.5	7.3	8.9	5.9

Column 1 —— 5 pieces CFU 53, 54; CRTH 79, 80; ATAG 1 (See Column 3, Table II)
Column 2 —— 1 piece ATAG 19
Column 3 —— 1 piece ATAG 12
Column 4 —— 1 piece ATAG 13

They have been grouped together, but individually they can be shown to agree with the Corfu Roman group in column 1.

The fifth column in Table II shows data for another stamped handle excavated at Corinth (CRTH 81), and this can be shown to agree with the other Corfu reference group (column 4), as well as with the single sherd of Roman ware in column 6 (CFU 16).

these (excavated at Corinth) fits the group of 26; the other five (2 from Corfu, 2 from Corinth, 1 from the Athenian Agora) fit the group of Roman wares from Corfu and, of course, the piece of modern Corfu pottery.

Among the rosette-stamped amphora handles just discussed, one was excavated at the Athenian Agora. A considerable number of other amphora handles (unstamped) from the Athenian Agora

were also analyzed and three of these will be mentioned here (ATAG 12, 13, 19; Concordance IID). The analytical data are shown separately for these three in columns 2, 3, 4 of Table III. For comparison, we list again in column 1 the group of 5 stamped handles which were shown to be of Corfu provenience. Comparison shows that the three handles from the Athenian Agora are chemically indistinguishable, so these also came from Corfu.

In order to finish discussion of wares excavated on Corfu, mention will be made of some for which we do not have a definite view of provenience.

In Table I, column 2, a group of 21 samples of plain wares was presented but actually 26 were analyzed. The five omitted bear our numbers CFU 29, 30, 32, 33, 36 (see Concordance IIB). The amphora CFU 29 is tempered with hornfels and will be discussed below with Corinthian pottery. The two amphoras, CFU 30, 32, were alike in composition, and thin sections showed them to be quite rich in white mica (muscovite) as is Athenian pottery, but definitely they are not Athenian. CFU 33 and 36 are different from each other and also are of unknown provenience. No analytical data are presented because we have nothing to relate them to in this study.

The fine painted wares in columns 1 and 3 (Table I), excavated in Corfu, were selected by Dr. Dontas as manufactured in Corfu.[12] Analytically it has been shown definitely that the five pieces of fine painted ware in column 1, Table I, were manufactured in Corfu. Column 3, Table I, pertains to nine pieces of fine painted ware from Corfu also selected at the same time by Dr. Dontas. It is not repeated in Table II. It makes a good chemical group with the exception of the alkali elements Na, Rb, Cs. This variability of the alkali elements compositions has been observed in other areas. It differs from the sherds in column 1 by $> 4\sigma$ for five of eighteen elements, which makes them distinctly different. In Table II we list a number of comparison materials for Corfu pottery. No reference materials check column 3 so it is necessary to say that we do not have analytical evidence that these sherds were manufactured in Corfu. Archaeological support for Corfu manufacture comes from their stylistic similarity to the sherds in column 1. They definitely do not fit the sherds from Corinth (column 4). Stylistically they are not Italo-Corinthian. In quality the sherds of columns 1 and 3 (Table I) are related to the poorest of Corinthian painted pottery, not to the best.

III. *Jars from Corinth with Light-Colored Fabric (Table IV).*

In addition to the three amphora handles with the rosette stamp (Table II) thirteen other jars, mostly rims and shoulders, excavated in Corinth, were analyzed (CRTH 45-57, Concordance IIC). Eleven of these were untempered and two (CRTH 56, 57) were tempered with hornfels. The latter two and CRTH 45-48 made up a compact group which is indistinguishable from the fine Corinthian ware as already shown in Table I, column 5.

Six others (CRTH 50-55) made up a compact group which was distinctly different but had the puzzling feature that all elements except calcium were systematically lower than the fine Corinthian ware. If the values are multiplied by 1.17, they fall into line rather well with the Corinthian ware except for cesium which is still low. We call such instances "diluted" because they could arise from larger than normal amounts of calcium carbonate or other sterile material. It might also occur naturally. Mineralogical analysis gives some credence to the assumption that these could be of Corinthian manufacture since it is easily recognized that clay of lesser quality was often used for undecorated wares.[13]

Analytically we hesitate to assign provenience to this group because of the general similarity of wares of light-colored fabrics encountered over a fairly wide area in the Peloponnesus. A more elaborate study of jars of this kind will be required before one could state with confidence where this particular group was made although archaeological evidence points strongly to Corinth.

Contrary to fine painted ware whose composition did not vary over several centuries, the analysis of undecorated coarse ware, both light and red, ap-

[12] For further information on pottery of the Corinthian style manufactured in Corfu, see Dontas (supra n. 3).

[13] Farnsworth (supra n. 9) pl. 68, figs. 14 and 15. The loomweight (fig. 15) definitely shows more sterile material than the kotyle (fig. 14).

Table IV. Corinthian Light-fabric jars

	(1) Corinthian Jars (from Col. 5, Table I) (6 pieces)	(2) Corinthian Jars (6 pieces)	(3) Jars of Col. 2 x 1.17	(4) Single Jar (1 piece)
Fe (%)	5.13 ± 0.30	4.37 ± 0.17	5.11 ± 0.20	4.28
Ta	0.832 ± 0.049	0.684 ± 0.036	0.800 ± 0.042	0.887
Sc	20.10 ± 1.09	16.78 ± 0.79	19.62 ± 0.92	17.27
Co	26.82 ± 2.36	25.70 ± 1.98	30.06 ± 2.32	19.24
Cs	9.8 ± 1.3	5.8 ± 0.5	6.8 ± 0.5	6.7
Cr	228 ± 27	167 ± 8	193 ± 10	177
Hf	3.22 ± 0.47	2.71 ± 0.25	3.17 ± 0.29	5.19
Th	10.38 ± 0.78	8.70 ± 0.36	10.18 ± 0.42	10.86
Ni	207 ± 38	202 ± 11	236 ± 13	113
Rb	143 ± 12	101 ± 4	118 ± 5	102
La	29.9 ± 1.6	25.3 ± 1.5	29.6 ± 1.8	31.8
Lu	0.353 ± 0.014	0.312 ± 0.016	0.365 ± 0.020	0.405
U	2.27 ± 0.12	2.05 ± 0.08	2.40 ± 0.09	2.31
Ti (%)	0.453 ± 0.036	0.373 ± 0.019	0.436 ± 0.022	0.433
Mn	929 ± 93	764 ± 35	894 ± 41	952
Na (%)	0.539 ± 0.078	0.517 ± 0.021	0.605 ± 0.025	0.554
Al (%)	7.31 ± 0.65	6.17 ± 0.37	7.22 ± 0.43	7.09
Ca (%)	9.9 ± 1.3	12.4 ± 2.3	—	8.4

Column 1 —— (see Column 5, Table I) CRTH 45-48, 56, 57
Column 2 —— 6 pieces: CRTH 50-55
Column 3 —— Data of Column 2 multiplied by 1.17
Column 4 —— 1 piece: CRTH 49

pears to vary more. It should be pointed out that the firing of fine painted ware was complicated and necessarily closely controlled[14] while the firing of coarse ware was relatively simple. There is no technical reason why small producers should not have used local clay and fired plain ware in kilns such as one often sees in farmers' yards in Aegina today.

The single specimen (CRTH 49) was somewhat different from both these groups and is listed in column 4 of Table IV. All the data mentioned here are summarized in Table IV.

IV. *Jar Handles and Amphoras Plus Two Figurines (light) from the Athenian Agora (Table V).*

In all 21 samples from the Athenian Agora were analyzed. One of these was an amphora handle with a rosette stamp and is discussed in Section II above. Three of the amphora handles were shown by analysis to have been made in Corfu and are listed in Table III. Descriptions of the majority of these samples (20) can be found in Concordance IID. The handle with the rosette stamp is in Concordance IIA. The 20 sherds in Concordance IID consist of 16 amphora handles, 2 fragments of jars, and 2 figurines; 3 of the jar handles were made in Corfu.

Of the remaining 17 samples, 11 made up a compact group (ATAG 3, 4, 8-11, 14, 15, 18, 20, 21). An examination of the data shows that this group is not grossly different from the fine Corinthian ware of Table I, but there are many potteries which are similar to these analytically, and we are reluctant to call these 11 or the remaining 6 Corinthian.

[14] M. Farnsworth, "Draw Pieces as Aids to Correct Firing," *AJA* 64 (1960) 72-75, pl. 16.

Table V. Amphora handles from Athenian Agora and reference

	(1) Pointed Bottom Amphora Tempered with Hornfels (1 piece)	(2) Amphora Handles Athenian Agora (11 pieces)	(3) Amphora Handles and Figurines (3 pieces)	(4) Amphora Handles (1 piece)	(5) Amphora Handles (1 piece)	(6) Amphora Handles (1 piece)
Fe (%)	5.47	5.50 ± 0.29	3.50 ± 0.17	4.61	4.21	4.72
Ta	0.733	0.786 ± 0.075	0.633 ± 0.060	0.676	0.672	1.054
Sc	21.96	21.55 ± 1.29	14.64 ± 0.53	19.84	16.07	19.06
Co	39.05	31.87 ± 1.69	25.20 ± 2.51	28.07	21.86	27.94
Cs	7.0	6.9 ± 0.64	8.3 ± 0.74	15.9	6.4	6.4
Cr	326	365 ± 26	409 ± 9	500	324	282
Hf	3.91	3.95 ± 0.20	3.49 ± 0.38	3.92	3.84	4.68
Th	10.65	10.28 ± 0.36	6.74 ± 0.52	8.95	7.94	10.45
Ni	316	294 ± 35	311 ± 24	356	224	190
Rb	67	139 ± 16	83 ± 25	115	110	125
La	30.8	28.4 ± 1.3	19.2 ± 1.8	25.6	23.5	31.3
Lu	0.370	0.377 ± 0.017	0.253 ± 0.030	0.323	0.308	0.376
U	2.00	1.98 ± 0.16	3.07 ± 0.19	3.51	2.94	2.13
Ti (%)	0.460	0.450 ± 0.029	0.316 ± 0.035	0.477	0.406	0.429
Mn	1094	985 ± 137	593 ± 65	692	623	946
Na (%)	0.745	0.984 ± 0.097	0.343 ± 0.044	0.405	0.772	0.974
Al (%)	—	8.07 ± 0.34*	5.55 ± 0.41	—	—	—
Ca (%)	7.9	5.5 ± 1.3	14.8 ± 1.3	7.2	9.4	4.0

* Al measurements were made on only 3 samples.

Column 1 —— 1 piece: CFU 29
Column 2 —— 11 pieces: ATAG 3, 4, 8-11, 14, 15, 18, 20, 21
Column 3 —— 3 pieces: ATAG 2, 16, 17
Column 4 —— 1 piece: ATAG 5
Column 5 —— 1 piece: ATAG 7
Column 6 —— 1 piece: ATAG 6

Subsequent analytical evidence may show that clays of the composition shown here were used by Corinthian potters, but at present we do not know this.

The best evidence that the 11 jars (Table V, column 2) are Corinthian comes from their similarity to CFU 29 (column 1, Table V) which is a fragment tempered with hornfels excavated in Corfu (Concordance IIB). Until further analytical work adds to our knowledge, we must list the remaining 6 examples (columns 3, 4, 5, and 6, Table V) as of unknown provenience.[15]

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[15] We wish to thank Miss Carolyn Koehler for the Archaeological Introduction and for many helpful discussions.

I. Concordance of fine painted pottery

A. Excavated at Corinth

Berkeley Numbers		*Description*
CRTH	1	patterned aryballos; wall fr.
	2	patterned aryballos; wall fr.
	3	large patterned aryballos; wall fr.
	4	aryballos wall fr.; wheel motif
	5	aryballos fr.; bottom of pot
	6	aryballos mouth, large; petals
	7	aryballos mouth; thin petals
	8	aryballos mouth; thin petals, somewhat peeled
	9	aryballos mouth, broad petals, clay greenish; glaze partly peeled
	10	aryballos mouth, broad petals; clay greenish; glaze partly peeled
	11	skyphos fr.; glazed red

The eleven above are sixth-century B.C.

CRTH	15	small unglazed votive skyphos
	16	small unglazed votive skyphos
	17	small unglazed votive skyphos
	18	pyxis lid with knob
	19	pyxis lid; stepped
	20	small unglazed votive skyphos
	21	small unglazed votive skyphos
	22	small unglazed votive skyphos
	23	pyxis lid
	24	skyphos wall; heavy fabric

The ten above are fifth-century B.C.

CRTH	25	base of flat-bottomed oinochoe, triangles around bottom
	26	alabastron, mouth and wall; glaze partly peeled
	27	skyphos wall fr.; rays above base
	28	alabastron, mouth and upper wall; tongue decoration; added color
	29	oinochoe fr., shoulder and wall; incised tongues; metallic glaze
	30	aryballos mouth, tongues on rim; added color
	31	alabastron wall fr.; tongues
	40	body of flat-bottomed oinochoe; rays around bottom, tongues on shoulder; added color
	41	skyphos foot fr.; rays above base
	42	alabastron wall fr.; tongue pattern

The ten above are seventh-century B.C.

CRTH	32	ribbed wall fr.; open shape
	33	plate
	34	kantharos handle with rotelle
	35	kantharos handle with thumb rest
	36	kantharos foot
	37	skyphos rim fr.
	38	wall fr.; West Slope decoration
	39	domed lid fr.; incised decoration inside
	43	skyphos handle fr.; double rolled handle
	44	skyphos rim fr.

The ten samples above are fourth- and third-century B.C.

All the samples above, excavated in Corinth, were selected by Chrysoula Kardaras in Corinth, except CRTH 18, 19, 23, 24, which had been given to the Agora by Agnes Stillwell. Descriptions by Lucy Talcott.

B. Excavated in Corfu

Berkeley Numbers		*Description*
CFU	1	skyphos foot, rays
	2	skyphos wall fr., rays
	3	skyphos wall fr., rays
	4	skyphos wall fr., fine lines
	5	rolled rim fr.
	6	outturned rim fr.
	7	fr. of jug (?)
	8	skyphos handle
	9	wall fr., white tongues
	10	wall fr., heavy fabric
	11	handle fr. from jug

Berkeley Numbers	*Description*
12	wall fr., small shape
13	skyphos wall fr., narrow red bands
14	wall fr. of skyphos (?)

The fourteen samples directly above, excavated in Corfu, were selected by Dr. Dontas as probably made there. In quality these sherds are related to the poorest of Corinthian painted pottery, not to the best. Descriptions by Lucy Talcott.

C. Excavated in Aegina

Berkeley Numbers		*Description*
AEG	6	olpe fr.
	7	olpe fr.
	8	olpe fr.
	9	olpe fr.
	10	olpe fr.
	11	olpe fr.
	12	olpe fr.
	13	skyphos fr.
	14	skyphos fr.
	15	skyphos fr.
	16	skyphos fr.
	17	aryballos fr.
	18	aryballos fr.
	19	aryballos fr.

The fourteen sherds above are sixth-century B.C. Corinthian sherds from Dr. H. Walter's excavation at the Aphrodite Temple in Aegina. They were selected by Dr. F. Felten.

AEG	20	olpe (?) fr.
	21	kotyle fr.
	22	oinochoe (?) fr.
	23	bowl fr.
	24	bowl fr.

The five sherds above from the same vicinity are surface sherds from the collection of the British School in Athens.

AEG	28	skyphos fr.
	29	skyphos fr.
	30	skyphos fr.
	31	skyphos fr.
	32	skyphos fr.
	33	skyphos fr.
	34	skyphos fr.
	35	skyphos fr.
	36	skyphos fr.
	37	skyphos fr.
	38	skyphos fr.
	39	skyphos fr.

The 12 sherds above are seventh-century B.C. from the same site as the first fourteen.

II. Concordance of undecorated amphoras and other large jars (light)

A. Wine jars with rosette stamp excavated in Corfu, Corinth, and the Athenian Agora

Berkeley Numbers	*Corfu, Corinth, and Agora Numbers*	*Description*
CFU 53	1648	seven rays (Branis)
54	1923	eight rays (Aphionas)
CRTH 79	C-62-146	six rays
80	C-64-379	six rays
81	C-69-106	eight rays
ATAG 1	SS786	seven rays

B. Amphoras and other large jars excavated in Corfu

Berkeley Numbers	*Corfu Numbers*	*Description*
CFU 18	1260	hydria (?)
19	1262	pointed amphora
20	1276	hydria
21	1274	base of pot
22	1279	base of pot
23	1319	pithos
24	1316	pointed amphora
25	1215	jug
26	1250	pithos
27	1251	lekane
28	1272	pithos
29	1248	pointed bottom amphora tempered with hornfels
30	1251	amphora
31	1261	pointed amphora (?)
32	1277	amphora
33	1255	hydria (?)
34	1257	pithos
35	1264	pot (?)
36	1269	pithos
37	1273	base of pot
38	1275	base of pot
39	1278	base of pot
40	1281	pot (?)
41	1283	large pot
42	1300	no description
43	1302	pithos

C. Wine jar fragments excavated in Corinth (neck and rim fragments)

Berkeley Numbers		*Description*
CRTH	45	broad inverted echinus rim; concave on top
	46	rim rounded outside; flat on top
	47	trace of handle attachment; rim slightly rounded outside; flat on top

48	similar to CRTH 47
49	rim slanting outside; heavily undercut at junction with neck; flat on top
50	smaller series; rim lightly rounded outside; flat on top
51	similar to CRTH 50
52	small neck fr.
53	small neck fr.
54	small neck fr.
55	small neck fr.
56	heavy jar tempered with hornfels
57	heavy jar tempered with hornfels

D. Amphora handles, amphoras, and figurines excavated in the Athenian Agora

Berkeley Numbers	*Agora Numbers*	*Description*
ATAG 2	P21937	no. 107 on pl. 34, *Hesperia* 22 (1953)
3	SS745	amphora handle
4	SS14102	amphora handle
5	P21936	no. 106 on pl. 34, *Hesperia* 22 (1953)
6	SS1140	amphora handle
7	SS2030	amphora handle
8	SS5420	amphora handle
9	SS8244	amphora handle
10	SS5974	amphora handle
11	SS14103	amphora handle
12	SS13059	amphora handle
13	SS11353	amphora handle
14	SS13126	amphora handle
15	SS14055	amphora handle
16	figurine fr.	uninventoried; from Herakles deposit; C18:3, *Hesperia* 34 (1965). Late second-century B.C.
17	figurine fr.	same provenience as ATAG16
18	SS10165	amphora handle
19	SS10178	amphora handle
20	SS10479	amphora handle
21	SS10687	amphora handle

III. Concordance of Roman ware from Corfu

Berkeley Numbers	*Corfu Numbers*	*Description*
CFU 16	no number	from Roman layer in Mrs. Evelpidis' garden
55	no number	base of amphora from Tsori near Corfu
56	61.8.9	lid from Institute of Olives near Roman Agora
59	no number	base of large amphora from Tsori
61	no number	base of amphora from Tsori
63	no number	handle from Tsori
64	no number	base of large amphora from Tsori
69	61.8.4	base of large amphora from Institute of Olives
70	61.87	base of kylix from Institute of Olives
71	61.6.3	rim of open jar from Institute of Olives

These together with a sample of modern pottery (CFU17) from the Mantouki district of Corfu were used for reference samples.

AA says she was at the Store on Aug 9 Tues. and she told him she would be in on Friday Aug. 12, but she was not there.

CORINTHIAN

1.XI.77

31.03

Copies of file cards of Corinthian A + B stamp types and shapes

On looking with Lucy Kristellis at the photocopies of the file cards, we find that the pages cannot be cut into cards, because the entries on the backs do not fit; i.e. although fronts + backs are of the front + back of the same page, they are somewhat shifted apart — the copies were not made at the same time.

31.01

1.XI.77

Corinthian A

stamps

I have looked through them, and find that we have copies of: Corinth A, stamps; Cor. B, stamps; Corinth A, shapes, but not Cor. B. shapes. For the shapes, in this copied form they will not be of useful here at present; and as they are on longer paper that does not fit in the letter file, I shall put them in the drawer of Carolyn's table in the showroom — SAH/section. The stamps, both A and B, I shall file here in the drawer with the few CORINTHIAN pages not taken by Carolyn. Here one sees more or less the repertory, though the photos are dim, and cover each side on a single card up; and the entries on the back are much flawed in reproduction, and sometimes nothing is to be seen.

photocopies of cards made ca. VIII.77 numbered now

AA suggests we number the pages; good idea.

OVER

I think we must ask Carolyn to return the cards made in this office. These are an important part of

31.01

1.XI.77

Corinthia
A

Stamps

photocopies
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made ca.
VIII.77

numbered
now

1. XI. 77

photographic
works until
c. VIII. 77

(NO
device
date)

[31.02]

Corinthian
B

stamps

1st issues,
Greek
letter + mon.
alphab.

A.A says she was at the Store on Aug. 9 Tues. and she told him she was not here on the Friday Aug. 12, but she was not here.

CORINTHIAN

1. XI. 77

31.03

Copies of file cards of Corinthian A + B stamp types and shapes

On looking with Lucy Kristellis at the photocopies of the file cards, we found that the pages cannot be cut into cards, because the entries on the backs do not fit i.e. although fronts + backs are on the front + back of a same page, they are sometimes shifted apart — the copies were not made at the same time.

23. VIII. 78 Photographing files (Carolyn (Studies has up to Cor. A. shapes — and does not have any of Cor. B. shapes)

I have looked through them, and find that we have copies of: Corinth A, stamps; Cor. B, stamps; Corinth A, shapes, but not Cor. B. shapes. For the shapes, in this copied form they will not be of useful here at present; and as they are on longer paper that does not fit in the letter files, I shall put them in the drawer of Carolyn's table in the 5 workroom — SAH section. The pages of stamps, both A and B, I shall file here in the drawer with the few CORINTHIAN papers not taken by Carolyn. Here one sees more or less the repertory, though the photos are dim, and on a single card cover each other up; and the entries on the back are much flawed in reproduction, and sometimes illegible to be seen.

AA suggests we number the pages; good idea.

OVER

I think we must ask Carolyn & return the cards made in this office. These are an important part of

(1.XI.77)

the records for every site represented on the backs of the cards.

CORINTHIAN

1.VIII.77

MEIT

the file card of Ἄπτερος I am taking to Carolyn, when she leaves the other Corinthian file cards upstairs until she leaves ca. Aug. 9.

On Ἄπτερος, there are these citations:

SS 6915

12131 (NSBF)

10802 (Q 8-9 - fill over floor of Sq. Bldg)

—Pella A528 (not handle)

Cairo Mus., Milne, Cat. Gén. XVIII, p. 124, 26112.

Allens, Mis. EM 5-9

Demetrias, Archaeology? excav. 1973, 217-196 BC

ASI

Sid 31.X.77

I see that what she has left us is photo copies of the cards, assembled in pages. Photos naturally don't show at all clearly (Also, the "coin" rubbings + other plots.) It would be a lot of work to get these into order to consult. ⊗ They do include the material added by her & our original file.

VG

31.X.77

Carolyn did not return the file cards to their places before she left for the U.S. I am afraid she took them with her. I have not heard from her at all since I left Greece in August 2. I wrote her from America & has planned work in Tennessee & he received when she got there.

⊗ Sid B. Hayden would like to have the job. Let her have a minor section, and see. She would have to be paid by time. Might discuss with Margie.

CORINTHIAN

Ground:
1.) with the Ks, specially hard to
tell comm. of item is plate =
item in plate text (as w.s. Carolyn's text - Cor. A. stamp
or plate)

2.) "Transdep - shaped" = almond-shaped?

As in some of the B duplicates (?), and like some statements, e.g. about all those — are there any duplicates among them?

Yes
No
Don't Know

This has bearing as to whether they are stamps,

Somewhere there will be? a full(y) length of stamp; grouped i.e. how many names, how many monograms, comment on results
How often are of them more than one?

4.VI.77

ms. p. 33 is in need of clearing: what is "no. 72"? Was it later dissolved into no. 72a, b, c? Why can't they all be known as single no.? Are they not duplicates? All this "perhaps" and "cp." about the N. Arms. w.s, does it just mean you haven't seen them?

(Begin again at 94)

8.VI.77

Start again with 105

AT/19

Alexandria
Burial Ground

From album of rubbings

LOWER ATTACHMENTS


AT/1


AT/4


AT/2


AT/10


AT/3


AT/11


AT/4


AT/12


AT/13


AT/5


A/T 14


AT/6


A/T 15


AT/7


A/T 16


A/T 17


AT/8


A/T 18

[35.01] Tue. 11:45

Miss Grace,

Carolyn is running behind schedule — won't be able to come down tomorrow. She's very sorry about the delay. Can she come later?

Nancy

35.02

Miss Virginia Dare

Friday afternoon

Dear Miss Grace,

Thank you for the Kypsi volume! a real treasure.

I plan to come down to the Agora next Tuesday. If you have time, I'd like to go over catalogue format – more form than substance, so it shouldn't take too long. As I mentioned, I'll be down to pick up some photos and check some other things, so we can talk another time if that's more convenient.

Hope I'll see you before then, however!

♡ Carolyn

[27.VII.37]

Wednesday noon

36

Dear Miss Grace,

I may yet make it to the phone, but meanwhile Barbara will see you in an hour or so. The eye doctor said I had some kind of infection, not serious, and prescribed some drops. I am much better, & rather feel I've got a whole new lease on life!

Would Friday be a good time for me to come down to finish off the Corinthian E stamps? I don't know if you'll have had time to read through the stamps introduction to see whether I've said anything outrageous, but not to worry if you haven't. Unless word comes back that Friday is not good, I'll appear.

Love,
Carolyn

[11.VII.77]

Monday morning

37a

Dear Miss Grace,

I have just come down with a summer cold and feel I should stay home today. That's at least the sensible thing, but it means I shall miss Dr. Barker at lunchtime, and I'm very sorry. Please give him my greetings.

Wednesday looks like the time for us to do the Keramikos, and I wonder whether I might meet with you some other day? I'll phone as soon as I surface, and in the meantime perhaps Mac or Barbara would transmit a message.

Anyway, I am able to work as long as I don't squander my energies. Will be in touch!

Yours, C—

Miss Grace

Thursday noon
[12.V.77]

Dear Miss Grace,

I brought my catalogue up to let Mme have a look, but I'll bring it back down tomorrow sometime to leave with you some more.

By several pages along the Corinthian B S#H part, I decided to give every different die a number (i.e. cat. entry) even where I have less information on it than is the case with those I've actually examined myself, as long as I can be sure it *is* Corinthian. Am drafting the rest of the explanatory pages.

Those strawberry ice creams were lovely, and David and I enjoyed them very much. I still feel apologetic about crashing your party, but it was most interesting and fun, and David wanted very much to see you again. Many thanks!

(X) 4.V.77

See you tomorrow?

Love,
Carolyn

Miss Virginia Grace

6.V.77

39.01

Carolyn's dissertation
notes.

Looking at (real) plates (i.e. not photographs)

a no. of items still not in place - for them nos. written in (nos and cat.).

Items that are in place, sts. no no. at all.

Wd. like to see captions - do the intro. plates need a statement?

Plates not too crowded, - anybody's

I don't see if she has included the c 9:7 jars, or anything later - no, but the way is open, because the plates for A are 1-6, and then for B we start over again with 1

+ Phases will indicate

There is a lot of work still to be done on them, before publication, anyhow.

Mr. Crampton's jar: don't see it - Doesn't Evidently

Odd; note the Boulder miniature - it keeps pretty normal proportions in reduction

Don't see also: the complete 5th c. Kavousi B jar
5th cent. jar in Patras

7.V.77

I got out the records of COLLS - VARIOUS, PATRAS MUS.

(7.V.77)

39.02

and see that in fact, neither the Patras jars nor anything as complete and intact (i.e. not disturbed by the necessity of mending) has been included. First out the principles of selection. Are all stamped? Anyhow, I think we need something as good as the Patras jars. Finally, I can't check, as she has my work file; a mistake not to have had her make her own cards. These, as they are needed here; we did this for the Lesbian. But I do have them print of the Patras jars.

I would think that also one or two of the later type of Patras would be needed, especially the latest in 420.3. The shape is not represented in the series as now put together.

Does she think they are not Corinthian? Local?? Or is there some other principle involved?

13.V.77

The plates, etc. tells me, are incomplete, and the Patras, etc., items are to be included (all to be re-numbered).

May 1, 1977

Dear Miss Grace,

Was passed on your kind words about possibly coming for drinks, and I thank you very much indeed. I know David would very much enjoy seeing you again.

We leave tomorrow morning early for Chania (or Santorini), however, and have a full week's itinerary. It must bring us back to Athens Sunday at any rate, since David flies back that night. I can't say what our plans might be at all on Sunday, so I dare not let you save part of it for us, though the thought makes me feel warm. If things work out happily I could give you a ring during the day, perhaps. At the latest, you'll hear of my safe docking on Monday!

Love,

Carolyn

41

AGORA EXCAVATIONS
AMERICAN SCHOOL OF CLASSICAL STUDIES
ATHENS 140 GREECE

September 24, 1976

Mr. Avshalom Zemer
Haifa Maritime Museum
198 Allenby Street
Haifa, Israel POB 771

Dear Mr. Zemer:

I hope you were pleased with the speed with which Miss Johnson wrote to you about your Roman amphoras (her letter of September 16). I did in fact spend another afternoon with her going over the material with our files. All in all, I have given you a fair amount of time, but have given all the pictures to Miss Johnson, as you asked me to. Can you give me another set of photographs (The drawings will not be needed.) to be kept in our files here? This would not be necessary if Miss Johnson were established here, but she is far away, and inquiries continue to come in here.

I did keep the photographs of your no. 5541 and its stamp. I may need to refer to this in a publication, as coming from perhaps from Cyprus and possibly from Kourion in Cyprus, though the stamp is unlike anything I know, and the fact that (as you told me) there is no ridge around the neck makes the identification more dubious, also. When can we expect your catalogue (? is it?) to be in print? as you told me that nearly everything was ready to go to the printers. I would like to be able to refer to your jar.

With best wishes,

Yours sincerely,

Virginia R. Grace

Avshalom gives date as: 3rd-2nd c BCE

(1)

22.III.77

She did come, and has taken the file of Cor. B. stamps uptown. (She already had the A.s, she tells me.) This to type off their catalogue for her dissertation, now under way.

She told me about the Tennessee job for next year which she has, and a possibility of one at Michigan for the following year. That, she thought, would fit in better with the amphora work here.

(11:00 A.M.) March 21, 1977

Greetings of Spring! Just a word to say I hope to come down tomorrow for at least a bit. I'm sorry I didn't manage to get myself signed for dinner tonight in time. Am making great strides!

♡ Carolyn

(2)

We looked over some amphoras (photos & drawings) about which people had inquired of her, — one of Zeus's, and one a private possession in the U.S. which bores Mme Virginie Demargne Roman.

She turned over to me some records I inherited in Syracuse — nothing like what we had hoped to find, but the staff of the museum were unable to find more, i.e. of the joined pairs listed by Gentili.

Providence, Rhode Island
February 8, 1977

43.01

Dear Miss Dace,

I am sitting in the train station awaiting the Amtrack special to New York, having had a very pleasant afternoon talking to Al Boegehold, Ross Holloway, and assorted others in the Classics and Art departments. Greetings to you from Mr. Holloway and the Boegeholds!

Prospects look very hopeful for next year, I am happy to say, though I can't be more specific at the moment. It looks like everything (in my case) should be sorted out by mid- or late March. Long before then, of course, I'll be back with you: my charter flight from London is booked for February 26.

It has been very good to see America, as I've been doing, but my wanderlust is more than sated. Having left home just two weeks ago yesterday, I must by now hold a record for miles covered per day. Davis, California; Lincoln, Nebraska; Chicago; New York; Knoxville, Tennessee; plus Princeton and Providence for good measure. I've no strength left to add up the miles.

Mrs. Will took me to lunch during the New York meetings, and we had a good chat. She seems still to be in final stages somewhere, finishing. Hard to pin her down, but I'm in no position to throw stones! I would have liked to get up to Amherst to give a talk and see her files, but time, as usual, ran out. I did give a lecture at the Spokane society of the A.I.A., and enjoyed my evening. Even got a small honorarium!

My family are quite well, and most of them in the throes of planning my sister Mary Ruth's wedding. If all goes well, I should be able to take my appointed place as maid of honor on August 27. Fortunately, Buzz (I hasten to say that he has some proper names, to wit, Edward and George) has enough brothers to go around for all of my sisters and me. Such plannings,

I must say, seem very far afield indeed. This morning (it is now Wednesday the 9th) I spent at the American Numismatic Society looking at coins of Gordianus. Two days ago I had a talk with Eve Harrison at the Institute; a week ago I spent the day seeing Mr. Shear and the ASCE people in Princeton. They (a Miss Linda Pappas, actually) seemed quite interested in the amphora project in Alexandria, ~~though~~ so that will be a possibility, perhaps, for the future.

I have seen Barbara Clinkenbeard, too, here during the last week. She has completed her article on Lesbians and sent one to HAT, one to TLS, and given me one for you and for myself.

I must confess, I am beyond much more than a straight recital of places and people by this point. Many I have seen send their greetings, and in due time I should remember all of them. Mrs. T., whom I called when in Princeton when I ran out of time to go see them at the Institute, sends her very best; Mr. van Doornik at Davis, Jerry Dexell at Knoxville, and a host of others! I have thought of you often, and look forward to a happy return very shortly.

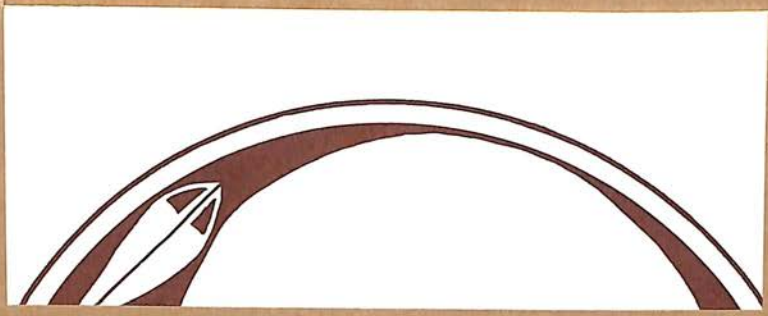
Love,

Carolyn

C. D. Hochler
S.E. 1140 Spring Street
Pullman, Wash. 99163 U.S.A.

44.01a

Miss Virginia R. Grace
American School of Classical Studies
54 Souidias
Athens 140
Greece



44.016

44.02a January 2, 1977

Dear Miss Grace,

I'm not sure this shouldn't be turned around ninety degrees, but nevertheless it brings all my warmest wishes and love for a happy birthday a week from today. At last I've reached the safety of the hinterland, only to realize that mail is very slow indeed. I only hope this won't be too late!

Christmas turned out to be a properly celebrated rural Yorkshire holiday which I enjoyed very much, including a sunny morning drive to nearby Fountains Abbey. New York brought many pleasures of friends and total exhaustion in the course of the meetings. Both projectors functioned during my talk, however, and so I am feeling on better terms with the whole mechanical world. This year does

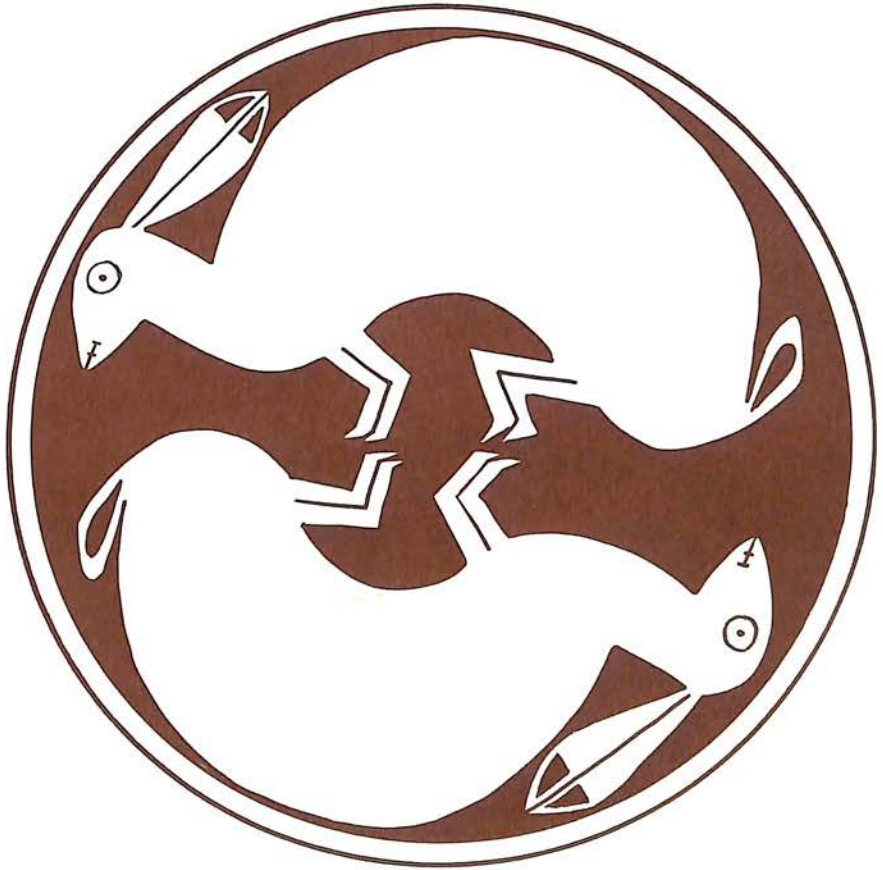
indeed look better for the number of positions open, and I had quite a few interviews, both formal and in-. Whether any will lead further, is yet to be seen. I had lunch with Letty Will one day, and spoke briefly with Barbara Clinken-beard. Two Corinthian A amphoras turned up at the meetings, each in a different paper!

Life is rather calmer around home for some reason this year, and I am already tackling official correspondence and dissertation. My dentist and doctor have (it is now Monday) pronounced me sound, and were it not for a lingering case of jet lag, I should be ready to race off again. How clearly I can focus upon you in Athens in my mind's eye! All the very best for the new year, until I can say so in person! Love, Carolyn

mimbres indian pottery design
southwestern new mexico · ad 1000 - 1200

LITHOGRAPHED FOR *Homestead Handprints* FLAGSTAFF, ARIZONA

44.026



8. XI. 76

45.01

Sa 8. 2

23. XI. 76 wrote ... C. Koch ... date

30. XI. 76 ~~1. XII. 76~~ leaves for Israel

19. Jan. XII due back & Athens

23. XII (5.30 c.m.) leaves for England

26. XII leaves London with Sarah B.

26 — 30. XII come of Ladera Segal in N.Y., for meetings.

~~30~~ 31. ~~XII. 76~~ for 4 weeks in Washington (state of) at most, visits her grandmother in Lincoln, Nebraska

1st week of Feb. in or near Princeton

9. II. 77, N.Y. & London

meeting with connection there

in Feb., 77, back here.

Her Goldwasser paper: will be given at Meetings (1st day, 1st paper). To come out in Harper; needs some more pictures.

Dissertation: hopes to have catalogue ready before she goes to Israel. brought

(2) (3)

45.02

3rd or 4th week of Feb., to do the Corinth duplicates. a week? more?

46b

ROMA
Ponte e Castel S. Angelo
Pont et Château St. Ange
Bridge and Castle St. Angel
Brücke und Engelsburg

ITALIA - EDIZIONI SOUVENIRS
ROMA - © 1972 RIPRODUZIONE INTERDETTA

23.VI.76 Hi from the romantic banks of the Tiber! Paul and I had a marvellous evening, and this afternoon drove to Metaponto, in order to visit the museum a complete Corinthian temple of the 3rd/4th of the 5th c. BC! Pompeii were rich indeed, and you can imagine our struggle to encompass them in 10 days. Friday, to Piperi, after I speak to the girl working in the pottery. (incid. some Corinthian pottery!) Yesterday I got [illegible] Acropolis!

MISS VIRGINIA GRACE

AMERICAN SCHOOL OF CLASSICAL STUDIES

54 SOUIDIAS

ATHENS 140

GREECE

476

EOLIE
Isola di Vulcano
Isle of Vulcano
Ile de Vulcano
Insel Vulcano

29. VI. 76

Tuesday morning just before delivering my paper - All is prepared, and (I hope) in order, and meanwhile I can direct myself by Thinking of the inimitable beauties of this region. Day after Tomorrow I proceed to Syracuse, where I may myself have to help host for your Rhodians. Well as ever best! It has been quite a fruitful conference, particularly with respect to meeting ample opportunity of various countries. Good bye!

Love, Caroline.

Miss Grace
ASCSA

kindness of
Michael
Katter

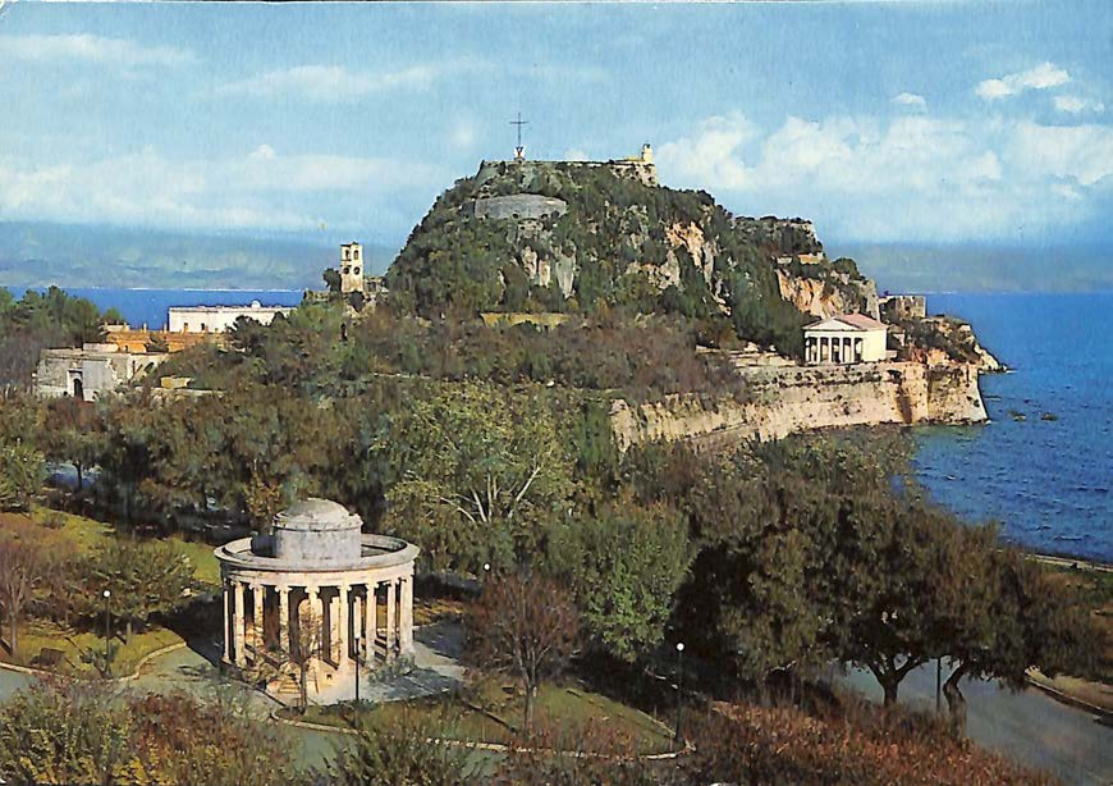
2910
Propri.ris. ELITE EOLIANA BELLETTI
© 1974 - Tel. 911282
98055 LIPARI (ME)

ALTEROCCA
TERNI - ITALY

25. VIII. 76

48

Note most of the files on Corinthia (A and B) have been with Carolyn Kocklen for some time, and not in this folder.



496

ΑΕΡΟΠΟΡΙΚΩΣ

MISS VIRGINIA R. GRACE

AMERICAN SCHOOL OF CLASSICAL

STUDIES

54 SOUIDIAS

ATHENS 140

14. VII. 76 8:00 A.M. Chara! Am just in on the Brindisi boat and in the process of finding a hotel and contacting Mrs. Choremis at the ephoreia. So I can't say much about my schedule, but I'll hope to stay here until Sunday, then proceed to Patras for a few days and finally home. Very tired in spirit, very much interesting, though no startling developments as yet. Will write! Am anxious to get back and see you! Love, Virginia

2
Κέρκυρα. Παλαιόν Φρούριον
Corfu: The old Fortress
Corfou: La vieille Forteresse
Korfu: Die alte Festung
Corfou: Il vecchio Castello

early grave inscr.:
SS 8845 for F 19:5
SS 9463 for F 19:4

7. XI. 75

50.01

C. G. Koehler's deposit list

Have been picking up this job, to prepare for the next issue I have on the deposits.

Cards were made for those not previously carded here (if they are on file, it is under their old grid nos., on yellow slips). The new cards are now in old-grid order, to be checked for info. in my RS deposit file, if any.

I note: the list is much longer than I had expected.

I suppose a list (for just, rather than stamps) are deposits present and listed in Agora XII. Probably should take those descriptions straight, except where there is reason to revise. Use LT's form, unless it does not fit with Corinth data.

I wonder how much else is that has all these to come from the deposits. One should not have, in an analysis of L 19:2 (SS, Brit. Mus. 113/A'), as 559543.

6.III.76
This one turned out to have been for K-L 18-20:1

Me
Trying to do these words so that is for as possible is across dsg for my Phoenix publication.

on the item a slip card, means V & had it listed as present in dep.

24.IX.75

SO.02

I've now gone through all the deposits, 47 in all. For some I had cards by the new grid numbers, which contained varying amounts of information; the others have been added. I have made notes of agreement and disagreement, but not proper summaries, as time; but it would have been all the better, the more plain statements could have been made. All this is on date.

She will now come in, and we will compare on these deposits.

6.III.76

Carolyn seems to have left for the U.S. about Dec. 21. We worked some on these deposits before she went, and have now been working on them through this week, March 1–6, except for a couple of days when she was in Corinth.

I think we worked through Co. A. deposits in chronol. order. Now we have been working through Co B deposits by alphab. order of deposit nos.

We have discussed dates, and caught a couple of items which had been assigned to the wrong deposits. I have made some notes on the (present) (not finished) appearance of the deposits, i.e. of the items in them. The deposits

(3 (6.III.76)

50.03

cards may now be filed in any file by new-grist nos.

ATH. AGORA : DEPOSITS carolyn Kochler, for CORINTHIAN

A 16 : 1 ✓
A 18 : 6 ✓
A-B 19-20 : 1 ✓
A 20 : 6 ✓
B 13 : 6 ✓ < B 16 : 1 ✓ or related (P 19253, Gr. A Fr.)
B 20 : 2 ✓
C 9 : 7 ✓
C 12 : 2 ✓
C 19 : 5 ✓
D 12 : 1 ✓
D 15 : 1, 2 ✓
D 15 : 3 ✓
F 12 : 3 ✓
F 16 : 6 ✓
F 16 : 8 ✓
F 19 : 2 ✓
F 19 : 4 ✓
F 19 : 5 ✓
G 11 : 1 ✓
G 11 : 3 ✓ (under cast of 4PDV)
H 12 : 15 ✓✓
H 17 : 1 ✓
H-K 12-15 : 1 MSBF ✓
J 11 : 1 ✓
J 12 : 3 ✓
J 18 : 4 ✓ (upper fills)

24. IV. 75

ATH. AGORA : DEPOSITS CONT (2)

K-L 18-20 : 1.

~~L 19:2~~ SS card wrongly marked L 19;2 . SS 95-4 = come from

L 20:2 ✓

M-N 15:1 ✓

N 7:3 ✓

N 10:2 ✓

~~N 20:4~~

N 21:4 ✓

O 16:4 ✓

O 19:4 ✓

P 6:7 ✓

P 16:4 ✓

~~P-R 6-12~~ ?

Q 10:1 ✓

Q 12:3 ✓

Q 13:5 ✓

Q 15:2 ✓

Q 18:3 ✓ n.g.?

R 13:5 ✓

R 17:5 ✓

U 13:1 ✓

V 24:2 ✓

26. IV. 75

No grid was got [illegible] by us;
T-stone fill inside archaic Athy (fountain house);
ca. 87-88 / MA, p. 215 [illegible] Late Geometric

25.IV.75

50.06

Deposits (Agora) in C.G.K.'s studio and no card is yet in our deposit file

Def.	Item in it	old grid no. of dep.
A 16:1	P 25741	ΠΠ, Bronze-casting pit
"upper fourth" A 18:6	SS 10048	NN Pit at 61-63/NΘ-Ξ
"est. 5th cy." A 20:6	P 17167	ΞΞ "Brown Hour" C 105-107/[illegible]
B 13:6	P 8429	ΠΘ, Well at 80/N
C 19:5	SS 10111	NN, House R Fill under drain tiles, etc
D 12:1	SS 5646	ΠΘ, Well 47/IB
D 15:12	P 11065	ΠΘ, Well at 115/ΣT @ 116/ΣT
F 12:3	SS 3016	B, Well at 33/KΔ
F 16:6	P 26427	ΣT, shaft at 17/E (cf pit, 16/Δ-E)
F 16:8	also SS 14651	K, Cistern and Well Marbleworkers' House
F 19:2	SS 8925	ΓΓ, Cistern at 38/M
F 19:4	P 16072	ΓΓ, Well at 46/NZ
	P 26403	
F 19:5	P 15912	ΓΓ Well at 47/MZ
G 11:3	P 12795	B Well near middle of Tholos
H 12:15	P 23373 – 23376	ΜΣ, Well A (ca. 500 B.C.)
H 17:1	P 15407	ΓΓ, Grave 4 (25/ΣT)
H-K 12:15 (MSBF)	SS 575	
	SS 745	Middle Stoa Bldg fill
	SS 1140	[illegible] deposits
	SS 1662	

(cont.)

(2)

50.07

Depos.	items in it	
H-K 12:15 (NWBF)	SS 11825	} Middle Stoa Bldg Fnd (cont.)
	SS 13059?	}
J 12:3	SS 1536	Θ, Hole at 17-27/KΘ-ΛZ
J 18:4	P 17804	ΔR P.t B Thamnou's cellar (House) at 17/K
L 20:2	P 26145	ΔΔ, Fifth Century Grave West of underground Drain at 94/1E
O 16:4.	SS 14057	}
	P 24767	} T, Pit in ancient road (ca 73/MET)
O 19:4	P 12655	O, well at 55/KE
P 6:7	P 29277	BΔ, Amphora Dump at P/2,3-6/6,8
P 16:4	P 22538	T, Filling over drain from E Room Archaic Fountain House
Q 10:1	?	ΣA, Filling of South Outer Foundation of Square Bldg
Q 13:5	P 25011	ΣA, Well bs Stoa Terrace Fountain
Q 18:3	SS 8005	Ψ, Well at 15/NB
R 13:5	P 2068	I, Well at 20/1Δ
R 17:5	P 26464	ΠA, Well A
U 13:1	?	PP, Well in Room 6 of Street Stoa U/2, U/3-13/15
V 24:2	P 13768	ΘA, Well 2 (5th c.)

Notes on Cor. A cat. (Again)

No. plates of Nos. 1, 2.

No. 3 appears in plate 8 but not full bkt. pres.; why "PH"?

a great many measurements. Checking all? What's not?

Still under no. 3: might be worth while – later? – to add at least a repres. one of the "3 similar but smaller jaws from same wall" – i.e. how similar? These have reps. in Coimbra VII, 2, but no detailed statements as to which they are like.

Indentation of "Date:"
which follows sts. 2.5.6 deposit, sts 2.5.no. 3 publ. rep.

"Counter Deposit: same as No. 2"


מצדה
MASADA

526

דואר אוויר
PAR AVION

MISS VIRGINIA GRACE

AMERICAN SCHOOL OF
CLASSICAL STUDIES
54 SOLIDIAS
ATHENS 140
GREECE

Dates of amphora sherds Kate, greetings! I've found quite a bit of Rhodian amphora material among these, including a Corinthian B sherd! It is Hellenistic. Very common to have found such a variety. Love, Carol

9.XII.76

מצדה – מראה כללי

שרידי מבצר בתוף ים המלח, בין־סדום לעין גדי, המבצר האחרון של המורדים היהודים ברומאים. 49 מ' מעל פני הים התיכון. 440 מ' מעל פני ים המלח. במרומי הר תלול וחשוף, מוקף ניאיות מסולעים ועמוקים. אחרי שנחרבה ירושלים בשנת 70 לסה"נ נמלטו אל מצדה רבים מגבורי יהודה ובראשם אלעזר בן־יאיר. הרומאים לא הצליחו לפרוץ למצודה לסיכל שמו עליה מצור ממושך. אחרי מצור של שלוש שנים כמעט ראו הלוחמים היהודים שאין להם תקוה והחליטו לשלוח יד בנפשם ולא ליפול חיים ביד האויב. — כך הפכה מצדה מצבת עולם לגבורה וסמל לעמידה עיקשת מול אויב כביר.

MASADA – GENERAL VIEW

Ruins of a fortress at the Dead Sea shore in the Wilderness of Judah, between Sodom and Ein-Gedi. The fortress situated on a cliff which rises majestically over the sea, cut off from the surrounding heights by deep gorges at its base. Masada was the last stronghold which held out against the Romans during the Jewish Revolt. At the end of three years of siege the defenders put themselves to death rather than fall into enemy's hands.

פלפוט PALPHOT
MADE IN ISRAEL

9371

Have received your card safely and was pleased to hear from you. Hope you can visit the country. Our meeting was delightful for Monday. I have worked for the Greek Ministry of Culture since leaving Athens. Carol

Sun. 21.II.75

53

Jim:

Please forward all first class mail to me while I am gone. Encl. 300 dr. toward this. If something looks crucial (goodness knows what), open it. If necessary, I shall of course cover Express charges too.

Until 27 Jan., at my parents: c/o Dr. Fred E. Koehler
S.E. 1140 Spring Street
Pullman
Washington 99163

509-568-5923

Between 12 Feb. and 25 Feb., when I return:
c/o Dr. Barbara Johnson
Institute for Advanced Study
Princeton
N.J. 08540
609--924-4400 ext. 265
or home: 109D Olden Lane
Princeton, N.J. 08540
609-921-3492

At all times, my parents will know where I am, so if anything dire happens, they can contact me. Phone if necessary!! Shelagh Meade will be looking after my apt. Miss Harrison may use it in Feb.; Mr. Alexander MacLeod will stay in it from today until 18.XIX Jan.

Thank you, and happy holidays!!!

Carolyn G. Koehler

Not much of a Christmas card, but at least my whereabouts! (copy of J. Wright's)

Much love,

Carolyn

Carolyn G. Koehler
S.E. 1140 Spring Street
Pullman, Washington 99163

549

AIR MAIL

Miss Virginia R. Grace
American School of Classical Studies
54 Souidias
Athens 140
GREECE

AEGEAN
Aegean Travel Service
Herbert Seefeldt
Box 275
(Guam)

546

Friday: later that same evening...
[11.IV.75]

Dear Miss Grace,

Never was I so prompt with a thank-you, the savour of a wonderful dinner still with me! But on my way home I stopped to check the mail, which over-speed up from the Shears's at 8:50 precluded: behold, not three blues, but at least a couple more pale, and a big brown cover to boot. I am still unwinding from what has been an evening of several pleasures, so I'll stop up and put them for you to find in the morning.

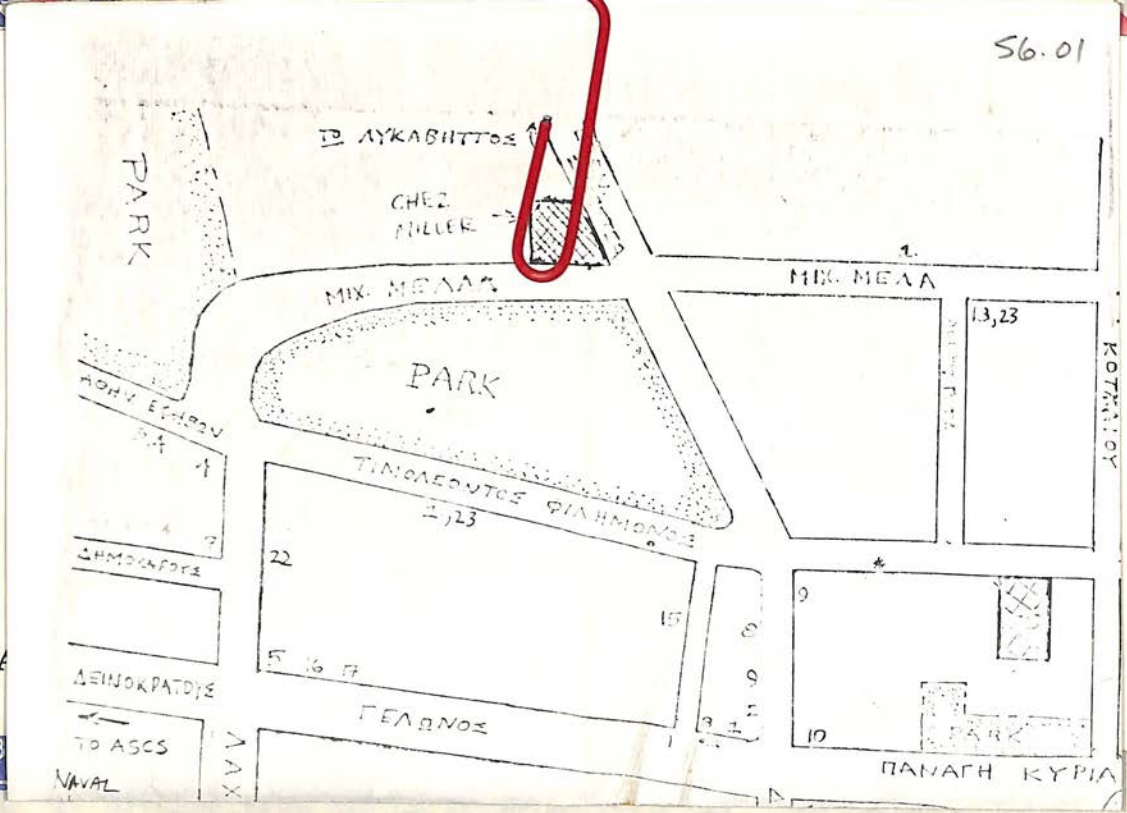
Really, though, what I most want to say is that I appreciated most of all, the happy confluence of old friends and new. Seeing known things from different angles — but maybe that's too philosophical for this

time of night. Still, with a background of filetto and strawberries, it was a repast of many dimensions! Thank you, indeed.

Love,

Carolyn

56.01


ΛΥΚΑΒΗΤΤΟΣ
CHEZ MILLER
PARK
ΜΙΧ. ΜΕΛΑ
ΜΙΧ. ΜΕΛΑ
PARK
13,23
ΚΟΛΟΚΟΤΡΩΝΗ
ΤΙΝΟΛΕΟΝΤΟΣ ΦΙΛΗΜΟΝΟΣ
13,23
ΔΗΜΟΚΑΡΟΥΣ
ΔΕΙΝΟΚΡΑΤΟΥΣ
ΓΕΛΩΝΟΣ
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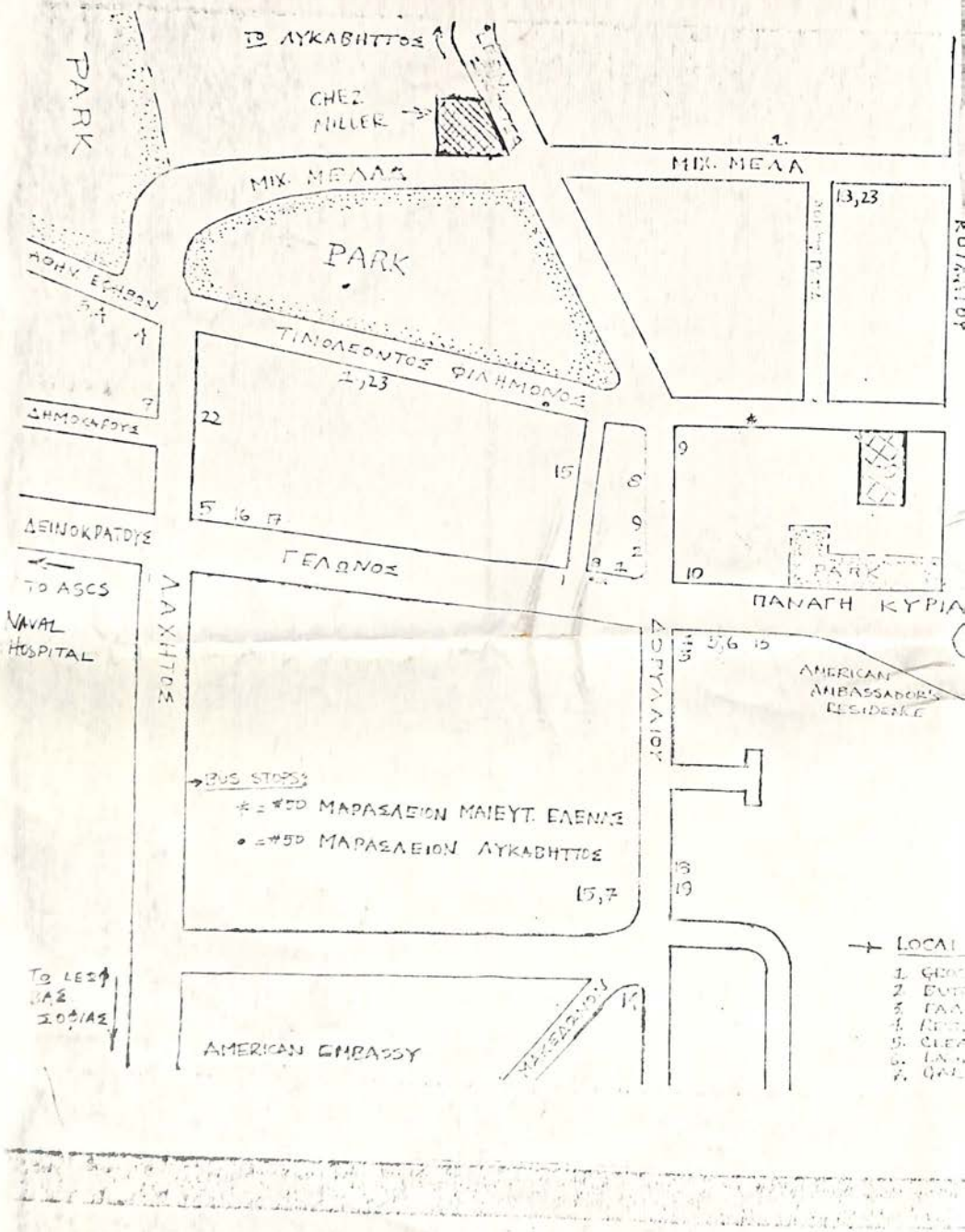
ΠΑΝΑΓΗ ΚΥΡΙΑ
PARK

56.01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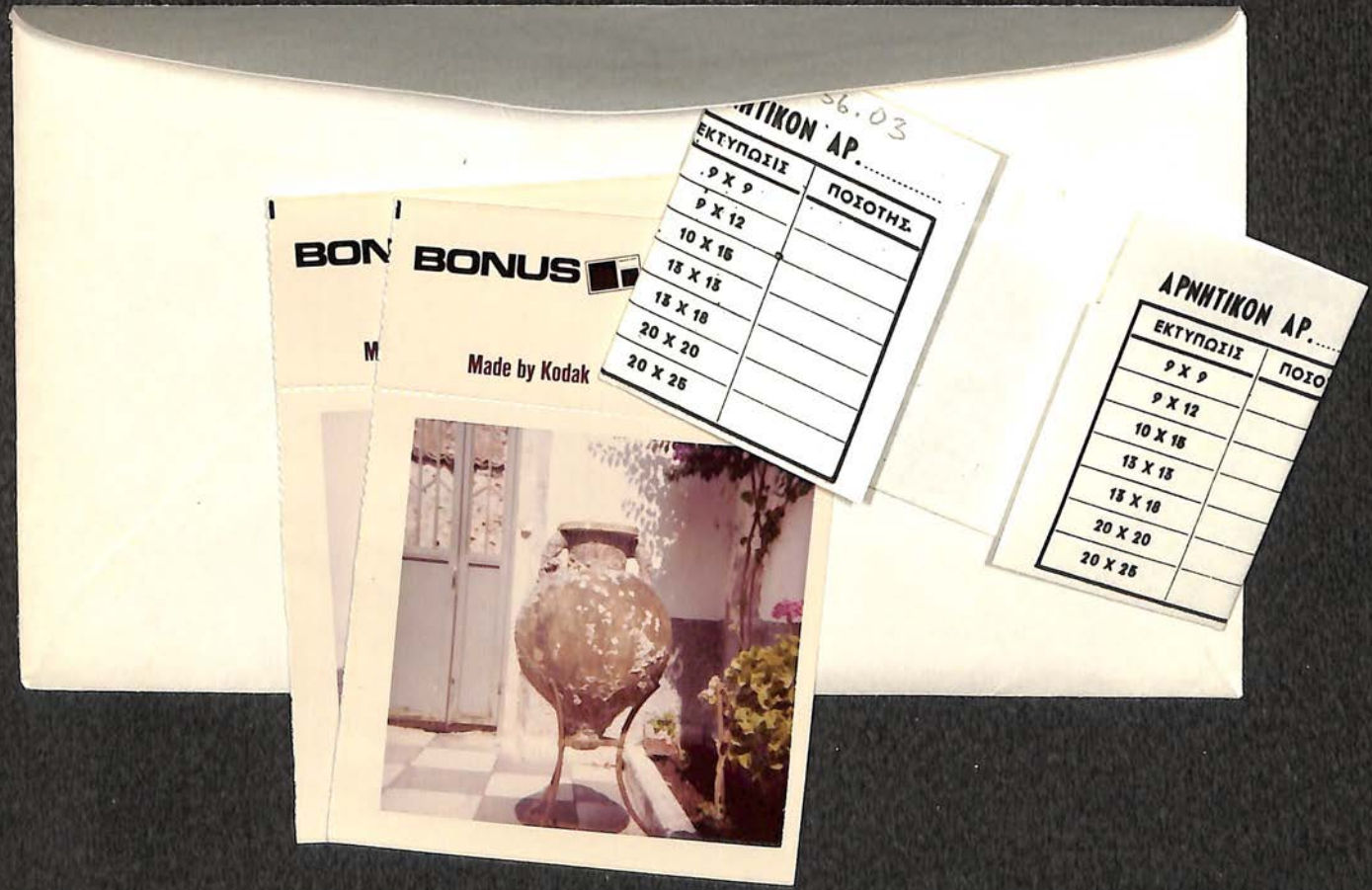
ΠΑΝΑΓΗ ΚΥΡΙΑ
AMERICAN AMBASSADOR'S RESIDENCE
ΤΟ ASCS
NAVAL HOSPITAL
ΛΑΧΗΤΟΣ
BUS STOPS:
* = #5D ΜΑΡΑΣΛΕΙΟΝ ΜΑΙΕΥΤ. ΕΛΕΝΗΣ
• = #5D ΜΑΡΑΣΛΕΙΟΝ ΛΥΚΑΒΗΤΤΟΣ
ΤΟ LESS ΑΣ ΣΟΦΙΑΣ
AMERICAN EMBASSY
LOCAL

S6.02

Miss Virginia Grace

AMERICAN PHILOLOGICAL ASSOCIATION
University of Illinois
Foreign Languages Building
Urbana, IL 61801

ANNUAL MEETING


56.03
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Made by Kodak
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56.03

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ΕΡΓΑΣΤΗΡΙΑ
ΕΓΧΡΩΜΩΝ
KODAK
ΑΘΗΝΑΙ

BONUS PHOTO
TRADEMARK

Made by Kodak

Galaxidi, Museum

Ht. ca. 0.72 m.

Corinthian amphora

BONUS PHOTO
TRADEMARK

Made by Kodak

Galapidi Tamara

Corinthian Amphora

Ht. ca. 0.72 m.

56.069

ESPRESSO
(EXPRÈS)

MISS VIRGINIA R. GRACE
AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOLIDIAS
ATHENS 140
GREECE

ΑΕΡΟΠΟΡΙΚΩΣ
BY AIR MAIL PAR AVION

Carolyn D. Koehler
AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOUIDIAS STREET
ATHENS 140, GREECE

56.066

(Will, via friend at Rome)
Have also sent you a carbon of this.

FLORENCE
5. XI. 74

Dear Miss Draze,

Oh with my diggy pace! Found the Corinthian jar of Tomb 779 at Ferrara, and it should indeed help with dating (ca. 300). I may nearly meet Kapitän halfway in the end, but so far no vast changes. This venture, I hardly need proclaim, is become some voyage indeed; you probably have already received my split-second report of the decision to go on → Paris and Marseille, since I have begun to define several classes or stages of jars similar to 6th cen. Cor B, and hope very much this confusion, and which began with my/your first correspondence with Bernard Lion as you remember, can be clarified. Perhaps even the problem solved! The many such jars I saw at Sicily, particularly Kamarina and Agrigento, spurred me to exist yet a bit longer in a suitcase. Yes, the glories of travel, but ah! the peace of home.

When I dashed from Rome, I had not yet figured out what to do about my AAUW grant application, which I fear is due (according to last year's schedule) the first of December. I had written for forms before I left, so they should be among the mail Allais Chandor has amassed for me; I have written her my plea to put one with its accompanying envelope in your box. I well remember your injunction last year to allow people doing such favors TIME, and realize that is all too short in view of the appalling state of the mails; nevertheless I hope you will have some leeway, and that last year's letter will have made this one easier. It is still a Dissertation Fellowship for which I am applying, since I won't be technically finished before 1 July. My Corinthian project stands, of course, as previously formulated; when I write my own part of the application I shall be able to say a bit more about the export of these jars. By the end of the tenure of this award (30. VI. 76) I hope not only to have completed + defended the dissertation, but to have prepared a manuscript for publication. The AAUW award probably represents my best chance of funds for next year, which is why I dare trouble all of you so. The others I shall apply for have, so far as I know, later deadlines and can be comfortably dealt with as soon as I return.

And when you may wonder, is that? I hope indeed, the end of the third week of November. If ever anyone needed to add d.v. to a rash statement! The strikes and disturbances here make me hope all the more that all be well for you in Athens, especially during the coming week. Well for all: I am realizing that more than a corner of my heart is Greek! And more than a corner yours, indeed.

With grateful thanks for your help, Carolyn

(OVER)

IN CASE OF NEED:

FELLOWSHIPS AWARDS COMMITTEE
AAUW EDUCATIONAL FOUNDATION
2401 VIRGINIA AVENUE, N.W.
WASHINGTON 7, D.C.

56.08

CITTA' DEL VATICANO
VI
12.11.74-18
POSTA AEREA

rec'd
20.XI.74

EXPRESS

56.099

MISS VIRGINIA R. GRACE
AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOLIDIAS
ATHENS 140
GREECE

ΑΕΡΟΠΟΡΙΚΩΣ
BY AIR MAIL PAR AVION

Exprès

Carolyn G. Koehler

AMERICAN SCHOOL OF CLASSICAL STUDIES

54 SOUIDIAS STREET

ATHENS 140, GREECE

56.096

S6.10

FLORENCE
5.VI.74

Dear Miss Grace,

On with my dizzy pace! Found the Corinthian jar of Tomb 779 at Ferrara, and it should indeed help with dating (ca. 300). I may nearly meet Kapitan halfway in the end, but so far no vast changes. This venture, I hardly need proclaim, is become some voyage indeed; you probably have already received my split-second report of the decision to go on → Paris and Marseille, since I have begun to define several classes or stages of jars similar to 6th cen. Cor B, and hope very much this confusion, and which began with my/your first correspondence with Bernard Tsion as you remember, can be clarified. Perhaps even the problem solved! The many such jars I saw at Sicily, particularly Kamarina and Agrigento, spurred me to exist yet a bit longer in a suitcase. Yes, the glories of travel, but ah! the peace of home.

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With grateful thanks for your help, Carolyn

(OVER)

IN CASE OF NEED:

FELLOWSHIPS AWARDS COMMITTEE
AAUW EDUCATIONAL FOUNDATION
2401 VIRGINIA AVE., N.W.
WASHINGTON 7, D.C.

S6.11


Mod. 24
ESPRESSO
(EXPRÈS)
31.10.74.19
LIRE
300
REPVBBLICA ITALIANA
31.10.74.
EXPRESS
56.129
Miss Virginia R. Grace
American School of Classical Studies
54 Souidias
Athens 140
GREECE
ΑΕΡΟΠΟΡΙΚΩΣ
BY AIR MAIL PAR AVION

AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOUIDIAS STREET
ATHENS 140, GREECE

56.12b

S6.13

Rec'd 5?. XI. 74

P.C. 6 Marseille (returns) 7. XI. 74

AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOUIDIAS STREET
ATHENS 140, GREECE

Thursday A.M. [31. X. 74 so cancelled, comments in Italy]

Dear Miss Grace,

This in tearing hurry as I depart for: Ferrara, Florence, Paris, and Marseille [!!!]. Enclose addresses & phones for my 2 fixed & later points, in case anyone at the School should want/need them (or you!). I saw more in Sicily of this "Massiliote" type such as Mrs. Lion in Marseille has, and suddenly decided that, to resolve my own confusion, which I can by now at least define, I must see his material. So in spite of phone strikes & port slow-downs here & in France, I'm off!

I'll stay with the Séviers in Paris, & will convey your greetings to the lovely so[n]

S6.146

C/o MR. & MRS. LEWIS J. SEVIER
22 RUE MARBEAU
PARIS 16 ème
553-5406
OR MR. SEVIER AT U.S. EMBASSY
tel. 00331-265-7400
7-10 NOV.

adventure. I'm nearly ready
I'll reach that state the end
I still have to do S. Italy.
Academy the 14th or 15th

Adieu, adieu. Oh, u
return!

Love,
Carolyn

S6.13

Mid Oct. ?; Fr. 74

P.C. 6 Marseille (returns) 7. XI. 74

AMERICAN SCHOOL OF CLASSICAL STUDIES
54 SOUIDIAS STREET
ATHENS 140, GREECE

Thursday A.M. [31. X. 74 so cancelled, sometime in Italy]

Dear Miss Grace,

This in tearing hurry as I depart for: Ferrara, Florence, Paris, and Marseille [!!!]. Enclose addresses & phones for my 2 fixed & later points, in case anyone at the School should want/need them (or you!). I saw more in Sicily of this "Massiliote" type such as Mrs. Lion in Marseille has, and suddenly decided that, to resolve my own confusion, which I can by now at least define, I must see his material. So in spite of phone strikes & post slow-downs here & in France, I'm off!

I'll stay with the Péviers in Paris, & will convey your greetings to the lovely soignée Mrs. S. Goodness, such adventure. I'm nearly ready for home and quiet; perhaps I'll reach that state the end of the 3rd week in November. I still have to do S. Italy. I shall be back here at the Academy the 14th or 15th of Nov.

Adieu, adieu. Oh, what tales I'll tell upon my return!

Love,
Carolyn

1 Luglio 311

S6.44a

DR. BERNARD LIOU
DIRECTION des RECHERCHES ARCHÉOLOGIQUES
SOUS-MARINES

FORT SAINT-JEAN
13235 MARSEILLE CEDEX 1

tel. 91-06-55

11-13 Nov.

Sc.146

C/O MR. & MRS. LEWIS J. SEVIER

22 RUE MARBEAU

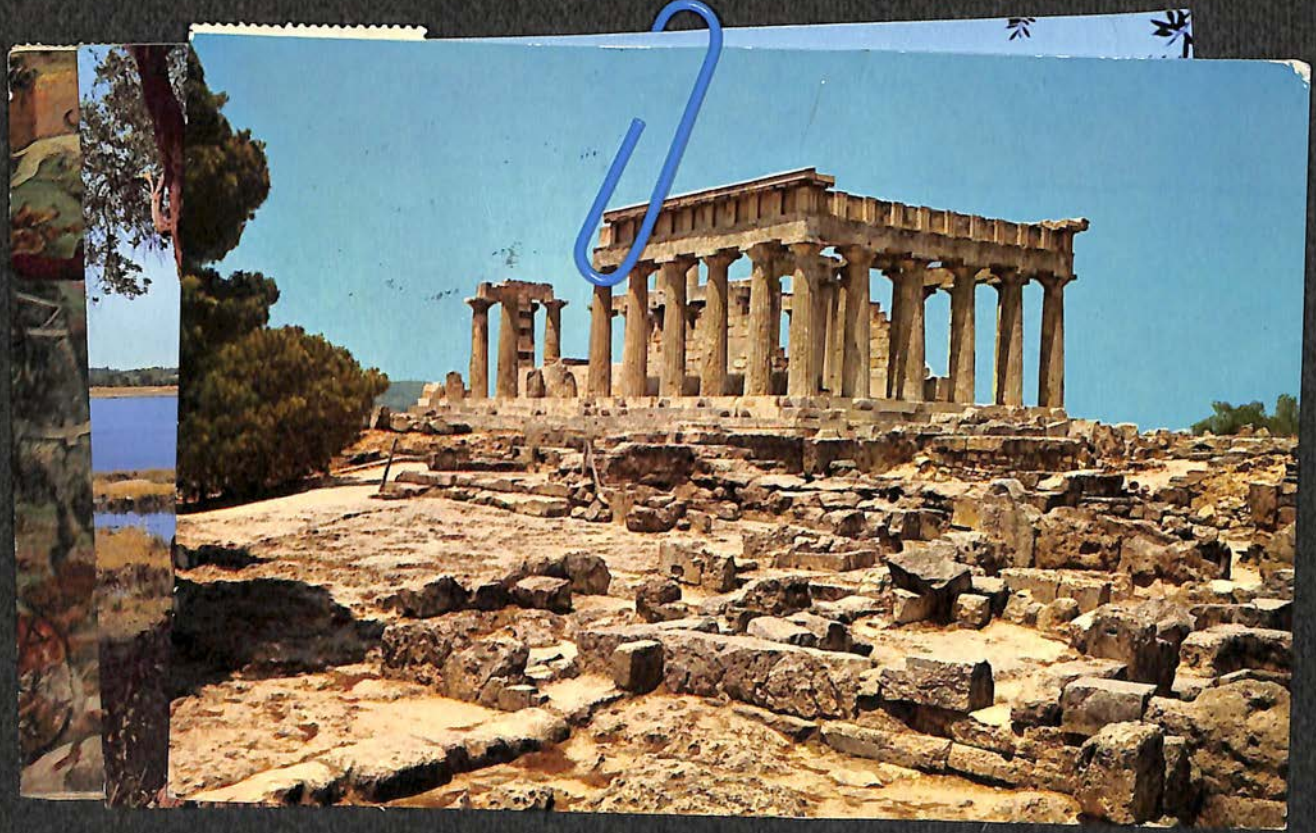
PARIS 16 eme

553-5406

OR MR. SEVIER AT U.S. EMBASSY

tel. 00331-265-7400

7-10 Nov.



ΕΛΛΑΣ
GREECE - GRIECHENLAND - GRÈ

23.III.74 Hi! I seem always to write my postcards and cabinet brotherly but at least both Agrina & Olympia are in the care of Varvara! And to am I with happy results. It's a good thing I allowed this much time, though, because this morning the epimelitis took off without leaving the keys to the apotheke where those lovely Cr. amphoras lurk. So I'll just have to relax and work on my modern Greek during Independence Day celebrations! Weather Σας φιλώ

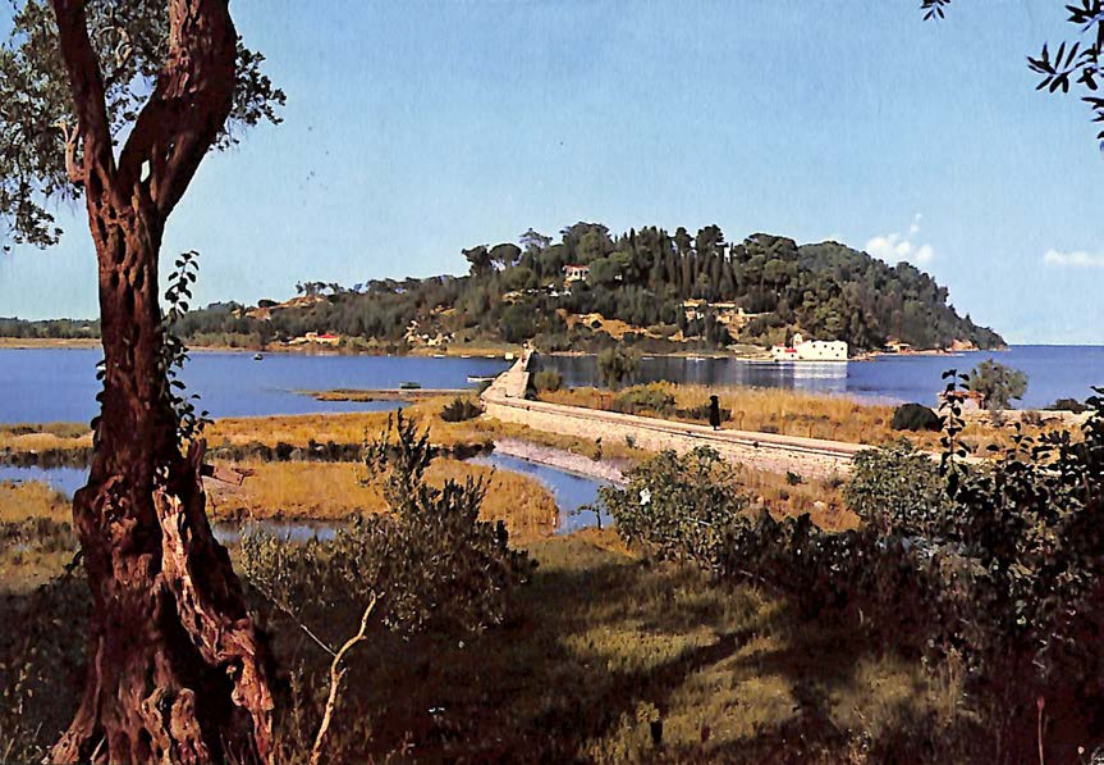
ΑΙΓΙΝΑ - Ὁ Ναός τῆς Ἀφαίας
AEGINA - The Tempel of Afaias
ÆGINA - Le Temple d'Afaias
ÆGINA - Tempel von Afaia

Copyright

57.016

Miss Virginia R. Grace
c/o American School of Classical Studies
54 Souidias
Athens 140
Ἀθῆναι

GRE 549



2.IV.74 A.M.

94 ΚΕΡΚΥΡΑ — ΠΟΝΤΙΚΟΝΗΣΙ
CORFOU — PONTICONISSI
CORFU — PONTICONISSI

Arrived happily yesterday on the ferry-boat from Igoumenitsa; a little cold but glad to have arrived intact after quite a journey. I love the mountains of NW Greece, though, however they impede speedy transportation! Corfu is indeed an amazing island; Venice in December was good preparation because I find I can now get lost in the maze of narrow streets in the old town here as thoroughly as Mary Laura and I did there! I'm off to see Mr. Choremis as soon as I mail this, & it's on w/ amphoras — Love, Carolyn

ΑΦΟΙ ΚΟΚΚΑΛΗ ΚΕΡΚΥΡΑ - ΤΗΛ. 81-002

ΑΕΡΟΠΟΡΙΚΩΣ

57.026

MISS VIRGINIA GRACE

AMERICAN SCHOOL OF CLASSICAL STUDIES

54 SOUIDIAS

Ἀθῆναι 140

3 - PALAZZO SCHIFANOIA - FERRARA
Francesco Del Cossa (1467)
Borso parte per la caccia

57.103b

MISS VIRGINIA R. GRACE

AMERICAN SCHOOL OF CLASSICAL STUDIES

54 SOULIDIAS

ATHENS 140

GREECE

Ediz. R.S.N.G. - Ferrara

Fotocolor Kodak Ektachrome - Riproduzione vietata

FOTOTIPIA BERRETTA s. p. a. - TERNI

16.IV.74 Home the 24th (Monday A.M.)! Leaving here Mon., → Brindisi & Taranto. Marvelle was digging, all 24 hours of it. Trance at this moment for next function, but my gamba in good paid off. Has Zeus this A.M.; hope to outdo Elizabeth. Will before she sweeps: I'm on the trail of three cats jam. Have hardly time to think! Item every kind I have practically done you, which I can hardly wait to show in person. Love & cheers, Carolyn

14.To.74 6 appointments this week. also [illegible] 13.Tx.74

Do A to talk & ask C give a paper at Christian meetings?

Worth doing, to state we now think "Gregory" is Gamble B?

The summary would be published in A N B

GELA

13. IX. 74

59

Discuss with C. Kokkin

Letter of 17. VII. 74 from Ch. Börker in COLLECTIONS: BERLIN asks if we have seen the publ. of Corinth B jars from Gela by Orlandini in 1956 Notizie. [miss by both of us] MEIT and I have certainly seen this publication, but have the Corinth been put into the SHAPES file? I don't find them here today, but maybe CK has got them casts separate, with items about to be seen in Sicily - Italy? Yes. I find the stamps in this article have been duplicated made, and have been filed. On some of the file cards, there is mention in the citations that there are Notizie jars... I see also that on Roll 541 there are reproductions of Corinth A - B from this article

14. IX.

I talk over with C. K. She has this material. She takes some notes of mine on material in Sicily - Italy.

60a

Saturday, 7 September 1974

Dear Miss Grace –

Such a lovely party last night! I did enjoy Dan very much, and was also glad of the chance to talk to Mr. Benaki and the Thompsons, all of whom I've seen too little this summer. May I say, that goes double for mine hostess, too!

Happy me, to have you all bound up with memories of that lovely filetto and chocolate soufflé.

Love,

Carolyn

606

Tony Hunt Kwakiutl Thunderbird

18.V.74

61,01

Chat with Carolyn

Her invitation program

Sept. Athens (Courts closed)

Oct. Sicily? (if caught Princeton travel grant)

Courts job is "½ time"; as Leslie said to me, it is just about (she says) financially. Sister coming in November & when she was this year, when added to $1000 she is getting from Princeton. (She tells me some wangling is required, which she does not like.)

What is chief bash as she now sees it is money & go to the U.S. for the Christmas Meetings (and to see the family); she feels this trip to be an important defence against isolation and getting lost. Her advisors, incl. Leslie, tell her the meetings are the only way to keep in touch with the academic world and possible jobs. At present she does not feel comfortable in Greece except in Corinth. She was not ready to tell me about current plotting of a personal nature, but she thought it would be better living outside the ASCS.

I said the research money I knew is for ample research, and it does not look as if she would be able to use it this year.

Perhaps — I now reflect — for the time after

61.02

1975
April 1 (? Stand) when the engagements of Christ ends, & take care of the spring, and summer, when finishing (work by) the dissertation.

This still leaves the problem of getting $ & US for Christ 1973 Meetings -

→ Nuttall, Edith Kermode
Mother of suppose
for most of i TLS jo
Their Annie 71
for part the work
things but &
when she was
this yr; and
she should
be dr. the
get on w.
dissertation
(for part time,
and partly
concerned
with her
dissert. material.)

COR. Gen.

12.V.74

62

Discuss with Carolyn

We first some cards in the Cor. B. file which are not done like our cards:

drive is set & the left (inst. of cards)

the Co number is not entered (so can't print in duplication, as capt that sequence is followed)

(Cards of) caduceus C-72-63 } Co 767
amphora C-70-56 }
devise maze (brand) C-71-275 } Co 760

She must draw the latest duplicates (although I asked her about this because the latest we draw here and with and she can't do on her)

Co 744 < 70-340

except there are 3 from after that, Co 742-744, which are for Potter Quarto, and have KP numbers, not C (date) numbers.

These were all done by MSTT.

So the later duplicates of Corinth, which presumably Carolyn has made (? all) just number concordance.

This goes back to CKW's unwillingness & leave his material in our files, because it was exposed to robbers.

⊗ I find a number concordance, dated 12.VIII.73. This is likely all there is. The non-Corinth are related for a

63a

Registered article / Envoi recommandé — ☒ Letter / Lettre — ☐ Print / Imprimé — ☐ Other / Autre

☐ Insured parcel / Colis avec valeur déclarée

Insured value / Valeur déclarée $

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Administration des Postes des Etats-Unis d'Amérique

636

C5

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CAROLYN G. KOEHLER
DEPT. OF ART & ARCHAEOLOGY
PRINCETON UNIVERSITY

Street and No. — **Rue et no.**

104 McCORMICK

City, State and Zip Code — **Localite**

PRINCETON, N.J. 08540

UNITED STATES OF AMERICA — *Etats-Unis d'Amérique*

PS Form 2865, July 1971

22.IX.74 64

CGK: ITALY-SICILY ITINERARY

22.Sept. Athens to Rome (Alitalia)
c/o American Academy in Rome
Via Angelo Masina (Porta San Pancrazia)
Rome 00153
0039-6-588653 or -654 or -655

1.Oct. Rome to Catania (Alitalia) to Syracuse (bus)
c/o Dr. Gerhard Kapitän
Viale Tica, 55
96100 Siracusa
(0931) 64652

21.Oct.? Syracuse to Messina to Reggio Calabria to Taranto (bus)
schedule uncertain
Soprintendente Prof. Gino Felice Lo Porto
Museo Nazionale
Taranto, Italy

25.Oct.? Taranto to Brindisi
Dr. Benita Sciarra
Museo Provinciale
Brindisi, Italy

28.Oct. Brindisi to Bari (bus) to Naples (Alitalia) to Rome (Alitalia)
unsure whether I shall keep to this schedule
again c/o the Academy, though I shall not stay there

30.Oct. Rome to Athens (Alitalia, arr. ca. 4:00 P.M.)

12.VII.69 [65.01]

Added also to Co

(from J. Bunsen)

Cor. A. Hamilton

from Potter's Q

KP 1721

from "Rect. S. Pit

2/2 5th cent."

Neg. nos. 66 21 18
66 119 23

65.02

10.VII.69
Corinth

[65.03]

— new jars
in Corinth

1971

HH

also other jars, see
standard / Agora nos
"Corinth B" jars

VIII 76
Pl. 2, no. 4, is not Corinth.
Pubd. in 706.11, but [illegible]

stamp: Palamthes. Cor. Tgs. of Hamilton
rubbing taken — dist. El. second

J. Bunsen's
(Potter's
Quarter)

Complete

12.VII.69 [65.01]

Add also to Co

(from J. Burson)

Cor. A. Chandler

from Pollux Q

KP 1721

from "Rect. S. P'to

2/2 5th and."

neg. mss. 66 21 18

66 119 23

65.02

30. VI. 69

Add to Co series:

4 wheel amphora in Amphoras isle style — see Hesp. 1969, pl. 2.

10. VII. 69

Ours is visible on a shelf, C 63-690 (Co. B area)

HT. dim.

HT

also other jars, see attached page with new "Corinth B" jars

VIII 76

Pl. 2, no. 4, is not Corinth. Repeated in 706.11, but is in not Corinth

Calipers for diam.?

10.VII.69
Cornutella

Need plastic.

[65.03]

Cornutella B — new jars in Cornutella

HSR's C 69-690
HT
HW
diam.

CKW's C 69-101
PH (to mini) 0.64 Ga (no Anal)
HH .165, .17
diam.

stamp: palmetto (on top of container) rubber tube — dirt to second

J. Benson's (P. Ellen's Gunter)
Complete

66

MINISTÈRE DES

Affaires Culturelles

Direction des Recherches Archéologiques
Sous-Marines

Fort Saint-Jean
13235 Marseille Cedex 1

Téléph. 91.06.55

Bernard LIOU
Co-directeur scientifique

Marseille, le 29 mars 1974

Miss Carolyn G. Koehler
American School of Classical Studies
54 Souidias Street
ATHENS 140 - Grèce

Mademoiselle,

J'ai bien reçu votre lettre du 11 mars, dont je vous remercie très vivement.

Je suis heureux de savoir que vous considérez ces amphores grecques archaïques comme corinthiennes, et qu'il faut les appeler "corinthiennes B", par opposition à l'autre type. Cependant je vous avoue que je reste un peu sur ma faim: j'ai rédigé il y a deux mois environ le petit article signalant les deux gisements de Cavalaire, en prévision duquel j'avais justement voulu consulter Miss Virginia Grace (il paraîtra dans une toute jeune revue qui s'appelle les Cahiers d'archéologie subaquatique). J'y ai écrit ceci: "On parle parfois (...) d'amphores corinthiennes; cette origine serait, à mon sens, à prouver". Et en note: "Cette forme d'amphore est présente à Corinthe: M. Thorne Campbell, A Well of the Black-figured Period at Corinth, dans Hesperia, 7, 1938, p. 604-605 et fig. 27, n° 192 et 193, - conjointement avec le type présenté par V. Grace, Amphoras and the Ancient Wine Trade, Princeton, 1961, fig. 35".

Autrement dit, les deux seules références dont je disposais sont aussi les deux seules que vous me signalez dans votre lettre. N'y en a-t-il pas d'autres? ou du moins d'autres résultats de fouilles, même non publiées, qui permettent d'affirmer cette origine corinthienne?

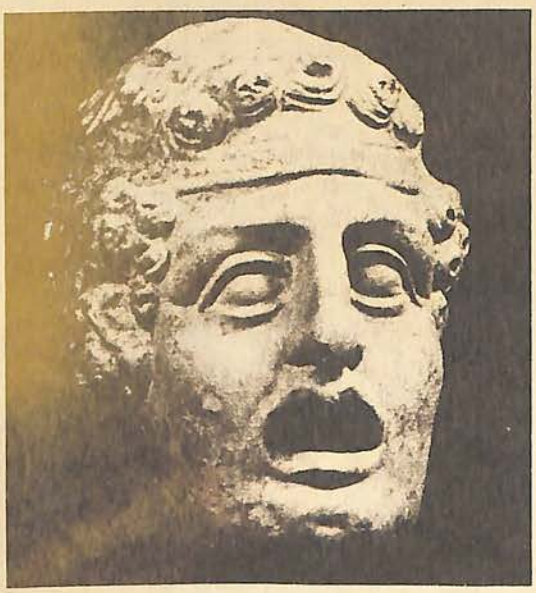
Je vous enverrai, bien entendu, mon article, qui paraîtra cet été. Vous y trouverez quelques exemplaires d'amphores de ce type et quelques rapprochement ou références qui vous intéresseront certainement. D'autre part, les deux gisements de Cavalaire seront fouillés à partir de cet été: je vous tiendrai au courant de ce qui en sortira.

Vous me proposez très gentiment de m'envoyer un exemplaire du petit livre de Miss Grace: je serais très heureux de le recevoir, car nous n'en avons qu'un exemplaire à la Direction des Recherches archéologiques sous-marines et je souhaite beaucoup le posséder personnellement.

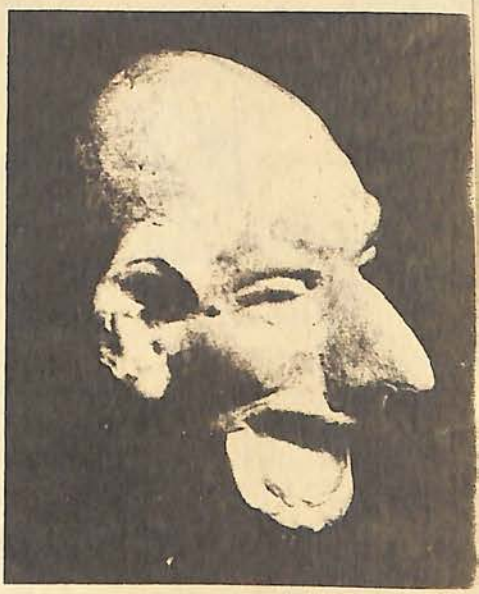
Enfin, je connais, bien entendu, l'usage du papier à cigarettes pour faire des frottis d'estampilles (j'en ai même toujours dans ma poche); il arrive cependant parfois (pas toujours) qu'on obtienne un meilleur résultat avec du papier pour téléscripteur: c'était le cas pour les timbres d'amphores de Cos que j'avais envoyés.

En vous remerciant encore et en espérant que nous échangerons des renseignements fructueux pour vous et pour moi, je vous prie de bien vouloir agréer, Mademoiselle, l'expression de mes sentiments les plus dévoués.

Bernard Liou



88 Grotesque head, Smyrnan, second century BC. Height 6.5 cm.



87 Mask of a youth. Myrinan, second century BC. Height 11 cm.

90 Negro boy clasping amphora. Asia Minor, second century BC. Height 8 cm.

89 Two grotesque heads. Smyrnan, second century BC. Height 7 cm.

7

228. Terracotta figure of a negro boy sleeping against a wine jar. Taranto; Greek, 4th century B.C. Sc. ¼.

Ashmolean Museum, Oxford

67.026

CHEAP RATES
TRUNK CALLS
6 PM – 6 AM
& SUNDAY AFTERNOONS

77 Oed High St
Headington
Oxford.

Dear Virginia,

How do you feel about this date? Personally, I'd bring it well down into the 3rd c. but what does the Amphie say?

We're having a wonderful time here, but are seldom allowed to work!

With greetings and best wishes from

DBT

Printed at the University Press, Oxford

Miss Virginia Grace
American School
54 Sweden St
Athens
Greece

Headington
Dec. 5 67.04

Dear Virginia.

Thanks. Of course such compositions are not really copies of statues. I was eager to know if you knew of any that showed Helios playing the ~~Lyre~~ Kithara. I'll have to look further.

I'm fascinated by just the amphora of that group so early. The modelling is excellent, of course, but the negro's head is so realistic & the pose so thoroughly plurifacial that even if it were in bronze, we'd tend to consider it, as carved, 3 cent. But if you can fix the jar, then

you give me just what I want. I need external pegs. The whole group is very Alexandrian in feeling; cf. a negro squatting by a post in Breccia, Monuments de l'Égypte gréco-romaine I.1, pl. XXXI,8 (finer than its photo). I think there's an even better parallel somewhere. Problem: how did jars get to Alex, be studied, made into f.s. & exported or copied in Tarentum? How long did jars hang around? I'll look further into this when I come back from Paris.

Have you seen Otto Menze, Früh. römische Amphoren als Zeitmarken in Spätlatène, Marburg, 1958?

Saw a delightful Restoration Comedy by Vanbrugh — one of the joys here is the good plays. Just too many goodies — "a perpetual feast of nectared sweets." Love to you

Headington
Jan 26

Dear Virginia,

At last I have got the photo of the jars against which the boy sleeps (his number is: 1884-5-8 3). It has enlarged nicely, so that you can now see the ~~11~~ line of the handles. Catling (who had studied our jars) & I both think that tho' the shape fits nicely with yr. Cancyrean, maybe the handles — ? Anyhow, it's for you to say!

No stamp anywhere, alas!

Publication: JHS VII, p. 379 pl. LXIV. It certainly seems Tarentine.

— To warn you, I gave your

name to Mrs Talbot-Albert, who may drop by in April. I think she would amuse you & would not want more than a glance of welcome, tea & perhaps a glance round within. She's an old friend of childhood, whom I literally have not seen & since I was 20! She's horsey & they hunt & it's another world, where of, I suspect, she'll be full, so gather up any horsey problems from anyone as it's the chance of a life-time — & please don't put scholarship out for her.

N. & I have just returned, thro' wide floods, from Leeds, where modern buildings & modern heat made us feel at home!

Love,

DBT

* Pity you missed Fanny — it would've been worth it!

CORCYREAN

Not urgent

[24 or 25. VIII. 61]

67.08

VIRGINIA

P 25762 (mortar)
(LA 3200)

How close is this to your pale "Corcyrean" fabric?

It is a good class for me - the color may vary a little + the original creamy surfacing be more or less worn off, but fabric about the same from mid 5th to mid 4th century.

These could compete with the Corinthian mortars because they are vastly lighter to handle. - I have put them down as probably from some pottery making centre near Corinth - but it could as well be closely associated with . . .

I asked Maria how fixed you consider the Corcyra identification, + she told me more than I could understand, but I was interested to hear that there is a second pinkish fabric also associated by the stamps. - I have too many pots of two many sorts related in one way or another to Corinthian, but not definable as Corinthian - so even a tentative suggestion

Faintly related - the Greek amphorae and the jugs from Cedrus's well - (21936, 21938, 21939, 21940)
Jug

We talked a little about this, and I said again what I had said [illegible]

67.09

CORCYREAN -
ASHMOLEAN T.C.

October 27, 1961

Dr. Bernard V. Bothmer
The Brooklyn Museum
Eastern Parkway, Brooklyn 38, N.Y., U. S. A.

Dear Dr. Bothmer:

See PICTURE BOOK CORRESP.

It was very good of you to send me such nice photographs of your steatite figurine of the cowering slave, which is indeed a very interesting parallel for the Ashmolean terracotta which appears in my booklet as figure 9. If Dorothy Thompson were here, I would show her the photos, since she takes a particular interest in the Ashmolean terracotta, and we have discussed its date. When she comes back in the spring I will show her the photos, unless in the meanwhile you have told her about them.

As possibly I told you, my illustration is taken from a postcard of the Ashmolean. Apparently the only serious publication of the piece is JHS VII, p.37, 9, pl.LXIV (from Dorothy T.).

As to date: the postcard called it 4th century; Dorothy T., at first thought anything so realistic should be later; the shape of the little jar (which seems to be of the class called Corcyrean or Corinthian (cf the jar to the left in fig.42, relation of handles to rim) suggested to me a date before 300 B.C.; and I think Dorothy later accepted this date tentatively - realism coming earlier in Magna Graecia (the piece comes from Taranto). If you can help with the date, I should be grateful for evidence or opinion from the Egyptian point of view.

I was delighted to hear how satisfactory was your session in the National Museum.

Yours sincerely,

67.11

Further correspondence, see under 67.10
"Representation" (TOSTIMENIS) - 2nd AD
(smaller hieros)

ens, January 30, 1960

Dear Dorothy,

Thank you for the lovely photograph of the amphora shown in the Ashmolean to. Yes, the way the handles are plastered up against the rim seems to me the most "Corcyrean" feature of this sketch of a jar. I enclose another print from our Patras expedition (420.4), with a couple of tops seen at a different angle, in case they help; please send it back if not useful. What seems less close in the copy, when one sees it full on as in your big photo, is the way the neck runs into the shoulder without articulation. I must just suppose that the koroplast was less interested in amphoras than I am. Or I must learn more about local western jars which might imitate the Corcyrean type, and be closer to this. The proportion of neck and body is wrong for a full-size Corcyrean, and it must be at least full-size unless that is a pigmy baby. But to what degree would they have noticed this? Half-size stamped Rhodian jars have quite different proportions of neck to body from those in full-size Rhodians.

My best greetings to Hector Catling, to whom I hope to write myself before too long. I imagine he has been keeping you up to date with developments in Peter Throckmorton's enterprise. I am so glad Peter is finally getting some recognition and help, having done so much spade-work practically unassisted.

I look forward to meeting your horsey friend Mrs. Talbot Albert. Does it rhyme? I suppose not.

I must go, as I have to arrive early at Jane Rabnett's party, where I am to be picked up by Dr. Jorg Schaefer, the Pergamene. Athens is like a game of Consequences, isn't it, in a social way. Did you know I went to Pergamon in October? At Boehringer's request, to look over their SAH. I was there several days, and then went on a lovely trip he had organized for the E.S.G.Robinsons, to Priene, Miletos, Didyma. Was in Turkey altogether a week. It seemed hugely more.

67.10

Further correspondence, see under

"Representation" (TESTIMONIA) – 2nd A1

(another hier.)

67.11

Athens, January 30, 1960

Dear Dorothy,

Thank you for the lovely photograph of the amphora shown in the Ashmolean to. Yes, the way the handles are plastered up against the rim seems to me the most "Corcyrean" feature of this sketch of a jar. I enclose another print from our Patras expedition (420.4), with a couple of tops seen at a different angle, in case they help; please send it back if not useful. What seems less close in the copy, when one sees it full on as in your big photo, is the way the neck runs into the shoulder without articulation. I must just suppose that the koroplast was less interested in amphoras than I am. Or I must learn more about local western jars which might imitate the Corcyrean type, and be closer to this. The proportion of neck and body is wrong for a full-size Corcyrean, and it must be at least full-size unless that is a pigmy baby. But to what degree would they have noticed this? Half-size stamped Rhodian jars have quite different proportions of neck to body from those in full-size Rhodians.

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CORCYREAN

67.12

Athens, December 9, 1959

Dear Dorothy,

On the Ashmolean t.c. with negro boy sleeping on amphora: I did not realize you were focusing on this at the moment. I could not be definitive on the jar certainly without more study, and I am impressed by your comments. I have never seen the object, and know it only in the photo reproduced on the post card. Can you give me a publication reference for it? Does the whole shape of the jar, down to the toe, show on the other side? I suppose not. I suppose that is not a stamp indicated as at the base of one handle?

The jar seems to belong to the series which has been tentatively called Corcyrean. I enclose a photo (420.2) taken on our trip to fetch Hetty from Patras; not very sharp, but may give the idea. These three jars, without any context, are in a row according to apparent chronological sequence. I should call the right one 3rd cent., and the left one 4th cent., and the middle one perhaps on the line between. The middle one seems most like the one in the t.c. It also seems to resemble a jar from Spina, seen at very small scale in pl.5 of Arias - Alfieri, Il Museo Archeologico di Ferrara, Ferrara, 1955, in the enclosure to the left, which is Tomb 779. On other items from this tomb, see ibid p.28, and see more fully in Aurigemma (1936), pp.128-9. The (very late) red-figure in this tomb was investigated for me in VI.58 by LT, and its accepted date described as late 4th - early 3rd.

See ITALY (SPINA) folder

A jar of the same series and of about the same date was found in Hadra and is displayed in the Musée Gréco-Romain in Alexandria. In a vitrine, there are one or two miniatures of the type. However, the class seems to have been rather popular in the West. Could the terracotta not be of local make?

Thank you very much for the refesence to Otto Menze's book. It sounds as if it would be particularly important for Letty. I have a letter to her ready for posting, but not yet closed, to which I will add this.

I am glad you are enjoying yourselves in this - "fur-lined assignation with the past."

SIRACUSA - Museo Archeologico Nazionale
Leone Corinzio sec. VII a.C.
Lion corinthien - VIIe s. av. J.-C.
Corinthian lion - VII cent. b.C.
Korinthischer Löwe - VII Jahrhundert v.Ch.

165

686

VIA AEREA

il nostro affettuoso
ricordo e tutti unisce
saluti da Siracusa

Paola Pelagatti
Carolyn

MISS VIRGINIA R. GRACE
AMERICAN SCHOOL OF
CLASSICAL STUDIES
SOLIDIAS 54
ATHENS 140
GRECIA
~~GREECE~~

January 10, 1975

a fierce bird for a birthday wish, but how grand! Of course this was meant for last night, but the fudge wouldn't. A final success, I hope; at any rate, it comes with my

love,

Carolyn

P.S. Refrigeration suggested, at least for the texture of the caramels.

Tony Hunt Kwakiutl Raven

for Miss Grace with love
and in anticipation of the second version
for which I shall have the final say!
Carolyn

KOEHLER, C.
carded

70.01

Volume 1. Ancient Technology to Modern Science

CERAMICS AND CIVILIZATION VOLUME II

TECHNOLOGY AND STYLE

Edited by
W. D. Kingery

Associate Editor
Esther Lense

The American Ceramic Society, Inc
Columbus, Ohio
1986

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Structure, Processing, Properties, and Style of Corinthian Transport Amphoras

P. B. VANDIVER

Conservation Analytical Lab
Smithsonian Institution
Washington, DC 20560
and
Ceramics and Glass Lab
Massachusetts Institute of Technology
Cambridge, MA 02139

C. G. KOEHLER

University of Maryland
Baltimore County
Catonsville, MD 21228

Differences between the three major types of Corinthian amphoras produced between the seventh and second centuries B.C. provided the basis for an investigation of how processing history and physical properties of these amphoras are related to technological and visual style. Type A amphoras were found to be impermeable to liquid and were hand built; type Bs were found to be permeable and wheel thrown; and type A′ were semipermeable and made by a combination of wheel and hand methods. The earliest amphoras, type A, were impermeable to liquids, because the potters (1) manipulated the calcareous, illitic clay body composition by adding a potash flux and a large proportion of coarse temper, which necessitated (2) forming by hand-building methods, and they (3) manipulated firing cycle and atmosphere by firing rapidly in reduction at the lower end of the firing range, about 800°C, and then oxidizing to a relatively high temperature of about 1000°C, both processes to promote the formation of glass and reduce permeability in the body. The later amphoras, types A′ and B, are permeable. Type Bs are made from a highly calcareous clay body without the addition of potash; type A′ amphoras are made from a variety of clay body compositions. Both types were fired to a slightly lower range of temperatures than was type A. The technology and visual appearance of these amphoras were consciously designed to produce properties such as impermeability and ease of handling. The variation in technological and visual styles demonstrates how interrelated are these two aspects of production and how each was changed to enable these vessels to serve the functions of transport, storage, and reuse. The development of these amphoras represents the gradual modification of preexisting technology to produce particular properties. Possible reasons for the observed changes in type A′ include: a functional change in which dry contents such as grain or nuts replaced wine, pickled fish, olive oil, and other largely liquid commodities as Corinthian exports, or the adoption of organic jar linings, such as beeswax or pine pitch, for advantages such as more cost-effective production, increased storage time, or changes in taste preference.

Amphoras were used to transport and store olive oil, wine, pickled fish, and other commodities in the ancient world. They must once have been as common a refuse of man's presence as oil drums or plastic containers

are today. The variations in appearance probably were as easily read as are labels on cans today, yielding such information as point of origin and expected contents. Corinth's wide, fertile plain and its strategic geographic position between the Peloponnesus and the mainland with vantages to both the east and west allowed a powerful trading center to develop with an excess of products for distribution. Olives and grapes are still grown, and in ancient times oil and wine would have been likely exports. There is no literary evidence for the export of these or other commodities, nor have traces of foodstuffs been found in Corinthian amphoras. Between the seventh and second centuries B.C., two styles of amphoras were manufactured at Corinth, the only city-state known to have manufactured more than one distinctive type of amphora concurrently over a long period. The characteristics of these two, called types A and B, have been described by V. R. Grace and C. G. Koehler using art historical and archeological criteria.[1] In plotting the form changes with time, Koehler discerned a later variant of the type A amphora she has called type A′,[2] thus bringing to three the number of amphora types. In this paper we examine the technological basis for this variation in appearance and find that the typology based on visual appearance covaries with a typology based on technological variables. Furthermore, there are relationships in design and function between these types of amphoras which allow a more precise cultural interpretation and appreciation of the level of technological sophistication of at least a part of the Greek pottery industry at Corinth in the first millennium B.C.

Manufacture of large storage jars was widespread in the Near East by about 6400 B.C.,[3] and some evidence for workshops specializing in the production of particular ceramic products dates from the Chalcolithic and Early Bronze Age of the Near East (for instance, see articles by E. F. and R. H. Henrickson in this volume). In examining pottery made during the first millennium B.C. at Corinth, we assumed a commonality of tradition with the eastern Mediterranean, craft specialization in the production of at least some wares, the presence of workshops (two tile works have been excavated at Corinth), and division of labor among various aspects of pottery production, raw material acquisition, and marketing, although the details are not known from documents or excavations. A second group of assumptions also was made based on preliminary visual examination: that a sophisticated level of technology in which there was some standardization in product, methods, and sequences of manufacture, and that the raw materials selection and forming and firing technologies had developed in such a way as to optimize the products. The results of this study revealed nothing which would negate or question the initial assumptions or model, but data were obtained which support a workshop model of production. Previous studies of the volumetric capacities of Corinthian amphoras have shown a spread of results, such that standardization of capacity could not be inferred.[4] In order to differentiate Corinthian from Punic amphoras, other studies have characterized raw materials[5] and a large group of amphoras from the fifth century B.C., some containing pickled fish, excavated in one structure at Corinth.[6] Our aim here is to examine structure, processing, and property variables in order to reconstruct the technology both of individual vessels and of changes in the manufacture of amphoras with time.

Methods

We characterized macro- and microstructure by the methods commonly used in materials science in combination with characterization of the working properties of local clays and replication of surface textures and objects. The work was conducted during parts of two summers at Corinth and parts of three school seasons at M.I.T. We observed with a hand lens and binocular microscope and individually described a sample of over 350 sherds and whole vessels, excavated at Corinth and dated to within 25- to 50-year periods, which are stored by type and period at the Corinth Excavations of the American School of Classical Studies at Athens. The purpose of such examination was to isolate those surface textures and joins which, when found in several examples, led to the reconstruction of a pattern of manufacture of the vessels and to an understanding of the properties and functions of the containers. Examples deviating from that pattern were also isolated. Instances of such deviations occurred, for instance, in the way potters handled problems of joining when parts were too dry.

Near the Corinth excavations, examples of clay were collected and preliminary replication studies of surface textures and one hand-built vessel were made, along with tests to determine drying and firing shrinkage. Ian Whitbread, a geologist and doctoral candidate at the University of Southampton, helped us collect examples of tempering materials he had identified in Corinthian amphoras using petrographic analysis. In addition, initial measurements of water absorption and the elapsed time and rate of wetting through the walls of sherds were made at Corinth. In the Ceramics and Glass Lab at M.I.T., the microstructures, compositions, firing temperatures, and porosities of 10 Corinthian fragments were determined using scanning electron microscopy,* electron microprobe analysis in wavelength and energy dispersive modes,† and mercury porosimetry. Results of two of these fragments, one from a fifth-century type A jar and the other from a fifth-century type B vessel, are reported in detail in this paper. These measurements were supplemented by investigation of an overfired roofing tile and a type B amphora fragment which had been excavated in sea water and which was used as a compositional control to test for salt contamination. In addition, several type B amphora replicas were made on a potter's wheel using clay and tempering materials from Corinth in order to replicate surface textures and the structures where parts were joined.

In summary, we began this study with low-power observation of the macrostructure of a large number of objects in order to reconstruct the techniques and sequences of manufacture and to compare the types and their variation through time. We then studied the microstructure and the microscopic variations in composition on the surface and interior of individual representative fragments to determine what raw materials were used and how they were formed and fired. In addition to understanding the raw materials and processes of making Corinthian amphoras, we tried to use the macrostructure and microstructure as a bridge to understand

*AMRAY 1000A, Bedford, MA with Tracor-Northern TM200 energy dispersive X-ray analyzer.

†Cameca MBX, France, with Tracor-Northern 1310 automation, Middleton, WI.

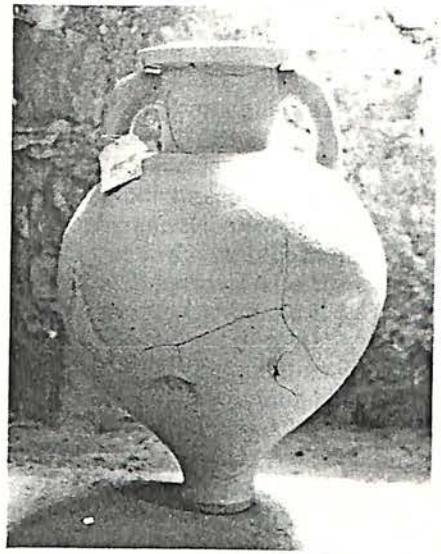

Fig. 1. Corinthian type A amphora, early second quarter of the sixth century B.C., showing capped toe, spherical body, handles attached at right angles to neck and body, and heavy overhanging rim (C-77-120).

and relate the raw materials and processes to the resultant properties. Replication attempts allowed us to get a feeling for the clay, the effects of processing variables, and the resultant morphologies which no other means could offer.

Description and Results

Description of Types A, A′, and B Amphoras

The different types of amphoras have different shapes, colors, hardnesses, fracture surface textures, inclusions, and surface treatments. Type A transport amphoras (as shown in Fig. 1), derived from large, round-bodied storage jars produced in the Geometric period, are recognized by a full, spherical body shape, broad cylindrical neck, two handles joined at right angles to the neck and body, and a heavy, overhanging rim (Fig. 2). They were manufactured from the early seventh century B.C. until about 300 B.C. (Fig. 3). During four centuries of production, the clay body was uniform, with a hard, quite vitreous fabric which in cross section is gray to red, with a lighter orange coloration on the external surfaces (Fig. 4, left). Generally, a gray core is sandwiched between thin red surface layers and a sliplike pinkish-yellow or orange surface which is slightly darker on the surface than on the subsurface interior. There are angular, gray-to-red inclusions of mudstone and tuffite, measuring 1–5 mm, with occasional inclusions of chert, fine quartz, and rounded pellets of fine yellow clay grog. Finely divided calcite lime is present but only rarely visible as inclusions in the clay.

Type B jars were manufactured from about 525 B.C. to at least the late third century B.C. and probably until the destruction of Corinth in 146

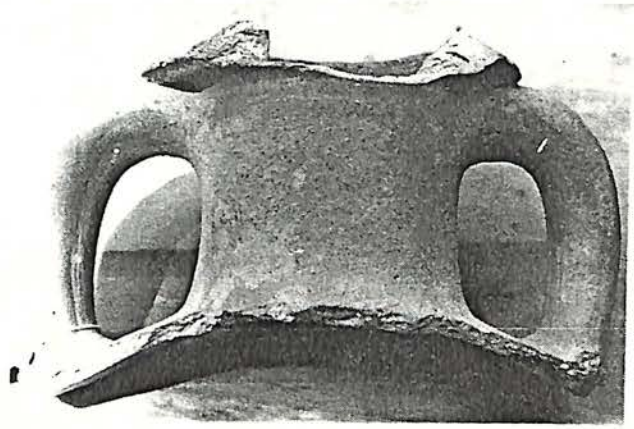

Fig. 2. On this early fourth-century B.C. amphora, the rim is formed by joining three coils. Over the handle attachments, the rim has been pressed downward. Extra clay has been added around the handle joints. On the neck side of the exterior of the handles, extra clay was added for strength, giving an oval section.

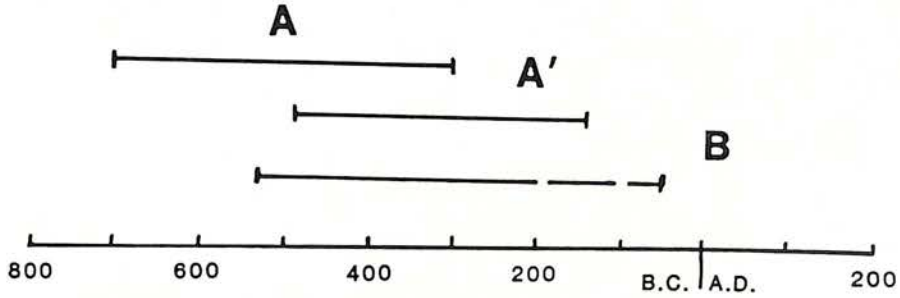

Fig. 3. Time line showing periods of production of each Corinthian amphora type.

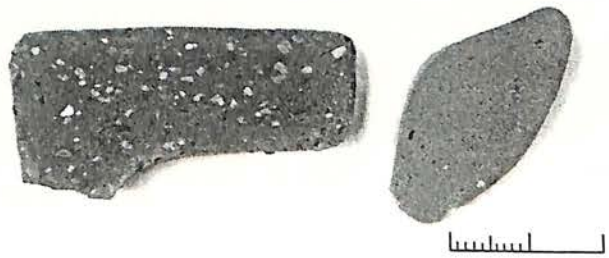

Fig. 4. Polished cross sections of a Corinthian type A rim (left) showing the gray interior and red outer layer as well as the large volume fraction of inclusions, and type B yellow rim (right) with few inclusions and pores (scale in millimeters).

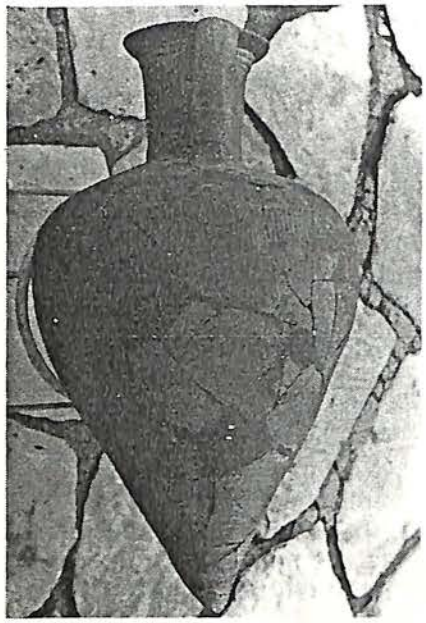

Fig. 5. Restored Corinthian type B amphora of the late fourth or early third century, with ribbing marks and indentations in the lower body wall from joins and from a supporting chuck. Note the smooth surface of the body mid-section and the parallel vertical marks from wrapping of the upper body to maintain its shape while the neck and handles were added. The toe has spiraling marks from ribbing (C-63-690).

B.C. (Fig. 3). Type B amphoras are recognized by a yellow body and surface, there are no red or gray inclusions, and only minor amounts of quartz (Fig. 4). The body fabric is quite soft, and porous. They have an ovoid body with pointed lower body ending in a toe (Fig. 5). There are high arched handles and a relatively thin rim. The upper part of the handle is joined on its side (or broad face) with the neck, and the lower joint is not quite at right angles (Fig. 6). By the second half of the fourth century, type B amphoras assumed the characteristic ovoid body which has an elongated lower part and pointed bottom, flaring rim, and high, arched handles. After the middle of the fifth century, the handles made a vertical join parallel to the neck and were pressed inward so that the upper neck and rim form an oval in plane view. Throughout production, the B jars had a yellow clay body and the inclusions are mostly quartz and chert; no mudstone or tuffite is present. In the late fourth century and following, a second Corinthian B fabric with a light reddish-brown clay was used for some jars.

Type A′ amphoras have the oxidized yellow clay fabric of type B with the dark red or gray inclusions (mudstone and tuffite) of type A. The shapes are similar to those of type A. Type A′ jars have an ovoid body and were first manufactured in the first half of the fifth century alongside type A. Their production is documented on and off until the

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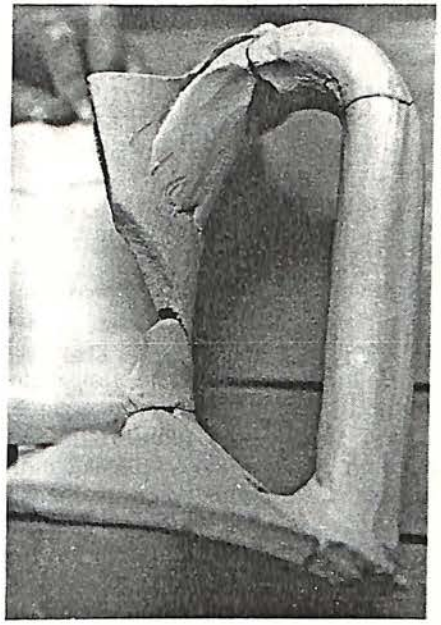

Fig. 6. Fragmentary neck showing join of the pulled handle to the neck and body. The diameter of the handle narrows toward the top of the jar (that is, opposite to the direction in which it was pulled). The surface area of the upper join was increased by joining the handle on its side, thus strengthening the joint. The lower handle joint was reinforced by adding a coil of clay at the joint which wraps around both sides and the inner surface (C-37-39).

mid-second century B.C. The characteristics of these three amphora types are summarized in Table I.

Reconstruction of Forming Processes from Investigation of Macrostructure

Evidence is presented below showing that type A amphoras were made by hand building, probably on a tournette or slow wheel, and type B jars were made by throwing on a potter's wheel. Vessels of type A′ were made by hand-forming methods at the beginning of their production early in the fifth century, but in the third century there was a transition to some of the fast-wheel techniques of type B, the first change being throwing of the neck. Thus, even though type A′ shapes are stylistically similar to those of type A, they are technologically divergent.

Even though two methods of manufacture were used for these different vessels, the sequence of manufacture is structurally the same for all types. In Fig. 7, a schematic drawing details the steps in manufacture. Although the forming techniques varied among the types and involved the very different processes of hand building and throwing, the approach to constructing a Corinthian jar by sections did not change. The sequence of steps reconstructed in Fig. 7 has been reinforced experimentally by hand-building techniques to replicate successfully a seventh-century type A jar, as shown in Fig. 8, and by throwing jars similar to fifth-century type B examples.

Table I. Characteristics of Corinthian Transport Amphoras

Type A (100 samples examined)
Color: Pinkish-orange surface (7.5YR, 7/4 to 7/6, pink to reddish yellow); in cross section gray core (5YR 6/1) and outer reddish layers (2.5YR 6/6, light red to 7.5YR 7/6, reddish yellow.) Sometimes the cross section is all red or gray, indicating a range of firing conditions. Such variation can occur within a single vessel.
Hardness: Surface medium-hard (Mohs 3–4), interior very hard (Mohs 5–6).
Fracture: Hackly or uneven; subconcoidal, almost glassy on gray interior.
Inclusions: abundant, angular white, red, and gray inclusions, 0.1–8.0 mm, averaging 1.0–2.0 mm, with volume fraction from 10 to 20%. Pores and inclusions are generally aligned parallel to surfaces. Occasionally pores are found and have secondary calcium-rich deposits.
Surface treatment: Orange surface layer, 0.05–0.2 mm thick, is usually present. In the second half of the fourth century near the end of the period of manufacture, there is an iron-rich clay slip, measuring up to 0.5 mm, painted or wiped unevenly on the upper surfaces of the jars as decoration.

Type A′ (about 50 examples)
Color: Light pink to light yellow surface (ranges from 10YR 8/2, white, to 10YR 8/3, very pale brown, to 7.5YR 7/4, pink). In cross section the color is generally pink (5YR 8/4 to 7.5YR 7/4). Sometimes, an outer layer occurs having the same color as the surface.
Hardness: Surface and interior have the same medium-hardness (Mohs 4–3).
Fracture: rough, polycrystalline fracture surface.
Inclusions: Occasional angular red and gray inclusions, ranging 0.1–8.0 mm and averaging about 1–2 mm, are present up to about 10 vol%. Fine pores, 0.1–0.5 mm, rarely as large as 1.0–4.0 mm, are also present. Occasionally there are pores shaped like organic material that has burned out during firing.
Surface treatment: none.

Type B (100 samples)
Color: Surface and interior are light pink to light brownish yellow (5YR 8/4 to 7.5YR 7/4, pink); some late fourth- and third-century jars are yellowish-red (2.5YR 6/6, light red).
Hardness: Medium-hard surface and interior (Mohs 3–4).
Fracture: Rough, polycrystalline fracture surface.
Inclusions: Rare occurrence of fine inclusions, 0.1–1.0 mm red, gray, or white. Fine pores 0.1–0.5, rarely 1–4 mm. Pores are elongated parallel to surfaces in walls, and tend to be rounded in rim and foot areas.
Surface treatment: none.

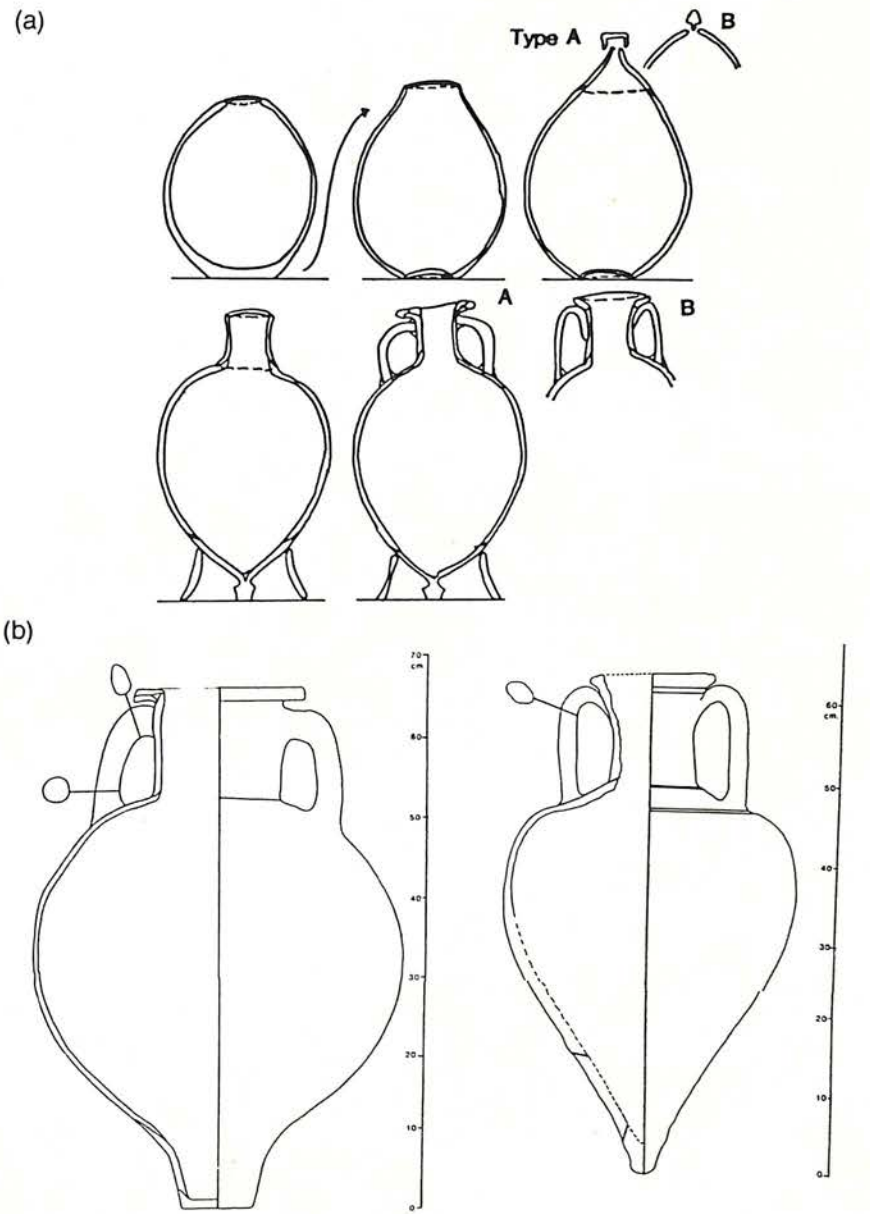

Fig. 7.(*a*) Sequence of production was the same for type A and type B amphoras. Type A′ also has the same progression. This schematic drawing of the sequence of steps in constructing a Corinthian container amphora is: (1) the body is built of slabs or thrown, right-side-up, (2) it is inverted and the lower body extended, (3) the toe is added with a cap or plug, (4) turned right-side-up again, the body is supported in a chuck while the neck is added, (5) the rim is built of coils and the handles are added. (*b*) Accurate drawing of type A (left) and B (right) amphoras of similar size showing the joints which were established by visual inspection (scale in cm).

Fig. 8. Comparison of a restored type A amphora of the seventh century B.C. (left) with a replica made from lignite quarry clay mixed with tuffite and mudstone from local deposits (right). The darker coloration of the replica is because the clay had not yet dried.

Forming began with the body, built up for types A and A′ of slabs or coils of clay and for type B by throwing from a single lump of clay on a fast wheel. Traces of the initial building elements have been obliterated by stretching and deformation of the body (Fig. 7(*b*)). The bottom would have been thick and solid in this initial phase, so that it would support the body wall built above it and would remain quite wet while the upper part stiffened as it began to dry. When the top was sufficiently firm, the body would have been turned upside-down, the bottom opened, and the lower wall of the vessel extended. After the period of partial drying that followed forming of the lower wall, the base or toe was added. The vessel was turned upright again and supported; the neck was then joined to the shoulder. Next the handles and rim were built up. Finally, the rim was given its final profile and sometimes reshaped around the upper handle attachment. These different types of amphoras reflect a shared mental template in their sequence of construction, even though the details of the processes are very different.

Without an understanding of the commonality in the way these vessels were constructed, we could easily be led to believe we are dealing with different groups of potters having completely different traditions of pottery manufacture. Instead, we find an underlying structural similarity in sequence of manufacture which reinforces the assumption of a commonality of tradition. Differences in manufacture between types A and B, however, do reinforce the assumption that there were different workshops operating at Corinth. On the other hand, these differences in manufacture between types A and A′ suggest that a conservative workshop technology was gradually, but incrementally, changed. We shall examine the technology in detail to examine these conjectures.

The methods of manufacture were reconstructed from observation of imprints of fingers and tools in the clay, variations in surface texture observed in raking light, and fractured surfaces that occurred at original joins or that changed direction at an original join. The sequence of steps in manufacturing was then reconstructed as a logical progression. Replication of throwing and hand-building methods using this sequence of manufacture, and the production of full-scale models, reinforced hypotheses about manufacture by relating each action to its textural effect and by replicating surface textures, marks, and joints. This approach to reconstruction of technology is not without precedent. In 1923, Gisela Richter[7] reconstructed Athenian vase-making techniques by replication and comparison. Anna Shepard[8] replicated surface textures using different surface treatments and recognized the importance of studying sherds in reconstructing methods of manufacture. Frederick Matson[9] has observed modern village potters, conducted replication and firing studies, and then used his observations and analyses to interpret and explain ancient ceramic technology. H. J. Franken and K. Kalsbeek[10] hypothesized the same sequence of manufacture for some Iron Age wares from Syria as described above, and W. Glanzman,[11] using xeroradiography, has proved the inversion method of closing bases. The significance of our study is that observation, replication, and documentation of many samples have been combined with analysis of materials and properties to reconstruct the technology as a complex of activities which cannot be defined by studies of the ceramic forming and firing alone. W. D. Kingery[12] has advanced this more holistic approach to studying ancient ceramics and several recent studies have tried to incorporate this approach.[13]

Type A Manufacture: Surface marks on Corinthian A jars are particularly varied in length, direction, and depth of imprint. Many of the jars have rows of diagonal marks about 0.01–0.15 m long, which extend from lower left to upper right (as one looks squarely at the exterior surface), and which indicate enlarging or shaping of the wall once it had been built (Fig. 9). They curve in the center of the body but are more nearly vertical and straighter at the base and the top of the body (Fig. 9). These indentations are frequently covered by marks from wiping of the surface, and require a strong raking light to be visible. In this early phase of construction, the left hand probably stroked the interior while the right hand braced and compressed the exterior. Slow rotation either of the potter or vessel accompanied this action, since the diagonal marks in the body form angles of 45° to 60° from horizontal and could not have been formed by throwing on a fast wheel. There is no evidence of circumferential ridges ascending in spirals on type A bodies, as would occur if centrifugal force were the prime means of raising the form. Traces of the original slabs or coils from which the body was formed have been obliterated by the subsequent deformation. The property which is most important to this method of forming is the relationship of plasticity to water content. Corinthian clay is plastic over a wide range of water content and thus can be worked, set aside, and reworked; this property enhances the type of construction described above. (Six samples of clays were collected and tested for presence of calcium carbonate, workability, drying, and firing shrinkage from the many deposits which Ian Whitbread has studied for his doctoral research, some of which Marie Farnsworth had located in her search for raw materials.[5] Each of the clays tested was found to be consistent with the picture of workability presented above.)

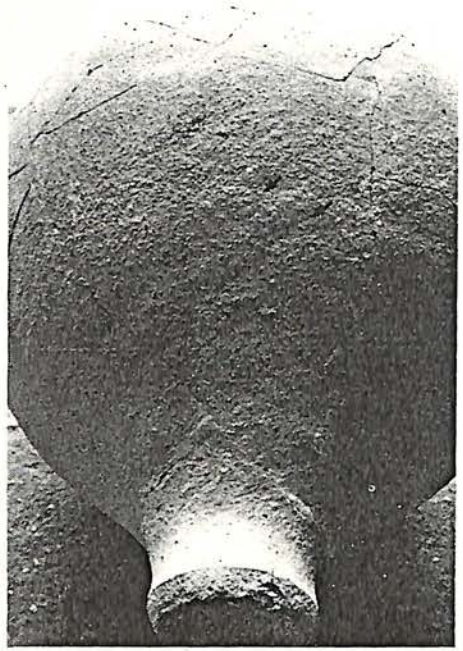

Fig. 9. Type A body construction with diagonal marks from hand forming on a turntable (small arrows), and a horizontal impression at center right that is from a supporting chuck (large arrow) (C-77-120).

The toe was completed before the neck was joined, as shown by three indentations about 120° apart on the lower body, made by pressure against the chuck or other device supporting it while the neck was worked (Fig. 9, right side). The evidence for the addition of the foot before the neck is, first, that there are no places found where neck or rim have been deformed from supporting the weight of the amphora while it was inverted to form the toe, yet there are indented support marks near the base. Second, the greater frequency of breaks and cracks caused by the joining of dry to relatively wet clay occurs at the join of the neck and body, not at the foot.

The toes or bases of type A amphoras were formed by capping (Figs. 10 and 11). In the seventh through fifth centuries, a flat disk of clay was added to the bottom of the wall and around the edge where foot meets wall. The corner was beveled or rounded, a practice which served to prevent chipping of the toe during handling. Sometimes extra sand and grog were pressed into the bottom of the base for better wear resistance (for instance, in the bottom of the fragment shown in Fig. 12). In some cases a plug of clay was pressed into the base from the interior. In the fourth- and third-century type A jars, an extension of the wall was first added to the lower body, almost closing it, and then a small cap was added and eventually shaped like a knob which would have made handling the heavy jar much easier (Figs. 12 and 13). Figure 11 shows an unusual case in which the wall and inner plug on the left and the cap with

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Fig. 10. Typical type A capped foot of the seventh century with part of the cap broken away where it was joined to the lower body. Differential shrinkage of the cap and wall of the body are shown to left, where drier wall shrank away from the wetter cap. The base of the wall was incised prior to joining (C-37-918).

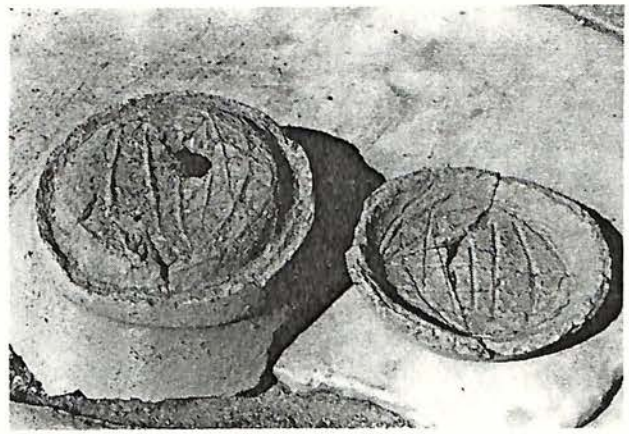


Fig. 11. Another type A capped foot of the seventh century, added when the wall was quite dry. The potter incised or scored the interior of the cap (shown at right), then from the interior a plug of clay was pressed into the middle to thicken and strengthen the base. This additional plug is atypical of early Corinthian A jars but demonstrates the care taken in making joints (C-40-498a,b).

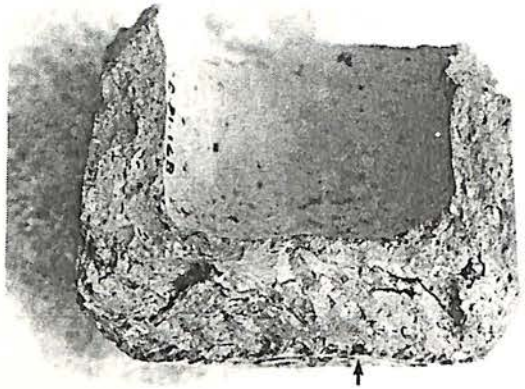


Fig. 12. Capped toe of mid-fifth century type A amphora. The lower part was narrowed on a turntable (marks are visible on the interior but not shown), and the capped toe was filled from the inside. To withstand wear on the base, the lower edge has been beveled and extra inclusions have been added to the resting surface (arrow points to one such inclusion) (C-81-168).

Fig. 13. Lower wall of an early fourth-century type A jar has been coiled (arrows indicate coils), narrowed by turning, and closed off. A cap was then added and ribbed without reworking the inside of the bottom (CP 3043).

depressions from scoring the inner wall on the right have shrunk away from one another during drying. The lower wall was too dry to join well to the cap, and the extra layer of clay was added on the inside to reinforce the join when the pot was turned upright. However, in this case the inner plug shrank away from the surrounding clay during drying and subsequently broke along the join, which was the weakest part. The knob was formed by ribbing or trimming to many shapes; the peg toe characteristic

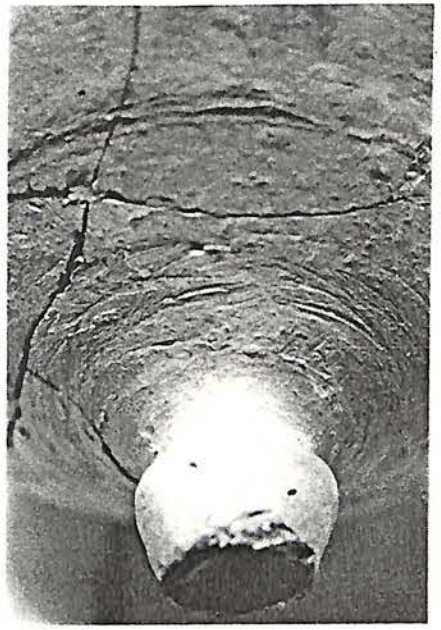


Fig. 14. Jar bottom of the second half of the fourth century. The capped toe has been trimmed to a peg shape with slanting sides with a tool, the edge of which left grooves spiraling around the body (C-1940-403).

of the second half of the fourth century was ribbed or plastically deformed with a bladelike potter's tool, now called a rib, whose corner left characteristic grooves around the lower body as it was rotated (Fig. 14).

For the first three centuries of their manufacture (i.e., 700–400 B.C.), type A necks were hand built, probably with the aid of a turntable, onto the body; only late in the fourth century, the last century of their manufacture, do ridges from a fast wheel appear on the neck interior. The partially set body was prepared by wetting and scoring with a blunt pointed stick, and then the neck was built on top of the body to form an overlapping or beveled joint (Figs. 15 and 16), in which the edge of the body was pressed upward on the inside of the neck and the neck smoothed down about 15–30 mm over the exterior surface of the body. Figure 15 shows the cross section of the neck and body, the diagonal line being the beveled join. Figure 16 shows the fracture surface at the bottom of the neck at the beveled join, the inner layer being the body and the outer layer the neck with raised impressions, made when the wet clay of the neck was placed onto the drier cross-hatched upper edge of the body. Where the join was made with clay of different degrees of dryness, differential drying shrinkage caused clay particles which could not align across the adjoining surfaces to pull apart, so that the joint cracked. In one example, the potter placed an extra coil of clay around the interior of the join (Fig. 17) to keep the join wetter longer and to equalize the water content of the clay in the body and the neck, but cracks opened nevertheless. These instances in the neck or foot (Figs. 10, 11, 15, 16) in which

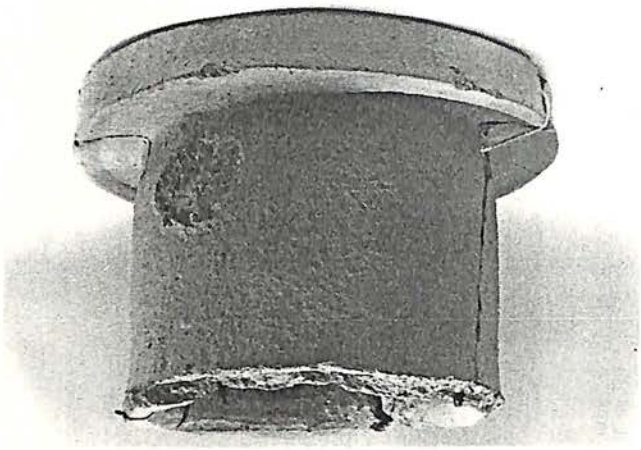


Fig. 15. Beveled join of preformed neck to body of seventh-century type A in which a preformed neck was set on top of the body. The joint is smoothed and rotated on a turntable, the neck is spread outward over the body, and the body wall is stretched upward into the neck interior. Note that the wetter neck has the greater extension. Marks from slow rotation are present on the interior and traces of smoothing on the exterior (C-1940-323).

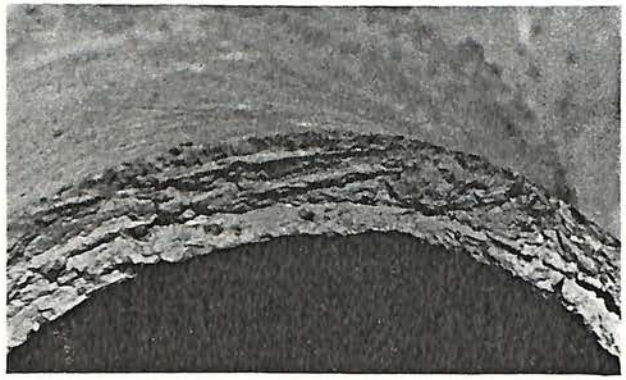


Fig. 16. Cross section of a broken joint on a seventh-century neck base. The neck was placed on the wall of the body (lower layer), which was then extended into the neck interior to form a beveled joint. Lines in relief on the edge of the neck (upper layer) mirror scored ones incised on the shoulder and show that the whole neck was added to the body, and was at the time the wetter clay (CP 45). Arrow shows join line of neck to body.

one part became too dry prior to adding the next part, and the attempts at correction of defects, strongly suggest the simultaneous manufacture of several jars. The rim or lip of type A jars was built of three or four coils, which were pressed together, extended, and finished by rotation (Fig.

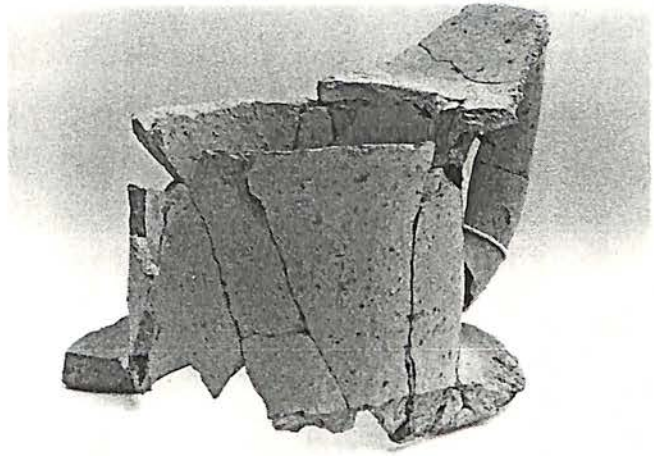


Fig. 17. A faulty beveled neck join (right arrow) on a seventh-century type A jar, made when the clay was too dry; the joint cracked prior to firing. The potter added the atypical inner coil (shown by left arrow) to try to mend the weak joint (C-1937-929).

18). In finishing, the surface was wiped or smoothed in a circumferential pattern on the rim and neck interior, and also on the neck exterior and handles, exposing inclusions on the surface (Figs. 2, 9, and 19).

In general, handles are oval in cross section except at the top of the handle, where clay has been added to thicken or make a spine along the outside edge at the top of the handle and where it joins the body (Figs. 1 and 2). These handles have been rolled; there are no ridges like those

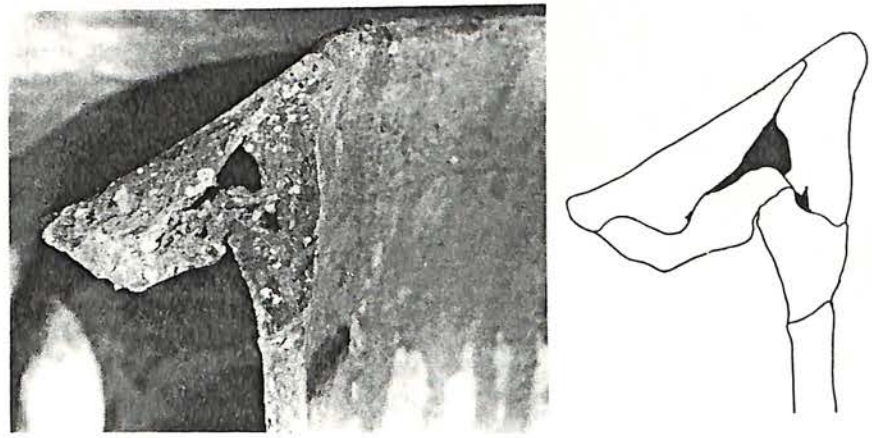


Fig. 18. Four coils have been joined to form the heavy, overhanging rim of the type A jar from the second half of the fourth century. Note the spaces where coils were incompletely joined, and the drip marks from the application of an iron-rich clay slip (C-1936-2449).

Fig. 19. Exterior of a seventh-century type A jar showing marks from surface wiping used to smooth the surface after parts have been joined, indicating the care taken in finishing the surface. The rounded, raised areas visible result from shrinkage of the clay around inclusions, and from bloating during firing (CP 43).

left by pulling out a handle, as is the case for type B jars. Neither are pores nor inclusions aligned with the long axis of the handles. Hand forming these handles was most practical because the many large inclusions in the type A fabric would have prevented even pulling of the handle; instead, it would have torn. Many of the handles have large interior cracks between the individual coils, particularly at the center (Fig. 20), because the exterior of the handle dried and shrank before the interior. The handles are the thickest parts of the type A amphoras. Their tendency to crack was of concern to the potters; many of the handles were pierced into the center with a small diameter point, something like a modern potter's needle tool, and sometimes more than once (Fig. 21). These stab or prick marks promoted even drying before firing and also released steam during firing.

Handles were joined at the base by scoring the body (Fig. 22). Upper joins do not appear to have been scored, however, which is another sign that the neck wall was wetter than the body wall (Fig. 23). In the fourth century a wedge was cut from the underside of the rim over each handle, so that its lower edge could be pressed down over the reinforced top of the handle. Clay was added at both attachments to smooth the transition visually from the handle to the vessel wall and to strengthen the joint (Figs. 2 and 22).

70.10

Fig. 20. Cross section of a fourth-century handle showing cracking and random alignment of inclusions. Formation of the handle was thus by rolling rather than pulling. Since the handle is the thickest part of the jar, the radial cracking shown here is quite common (C-1978-79).

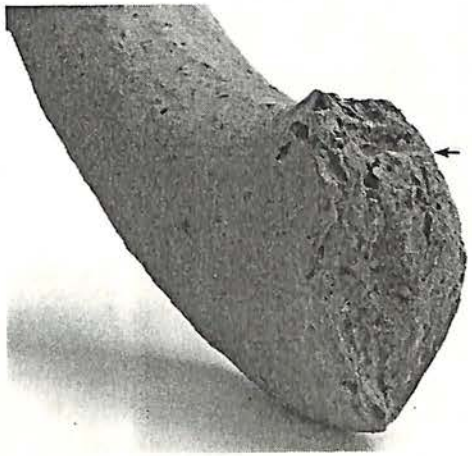


Fig. 21. Thick upper handle of a fifth-century type A amphora was built up to be oval in cross section. To alleviate the accumulation of steam during firing and to facilitate drying, potters often put holes up to 3 cm deep with a needle tool near the tops and bottoms of handles in the Archaic and Classical periods (C-1981-169).

Fig. 22. A fifth-century stamped handle (right) and body wall fragment (left) of type A with scoring at the joint. The handle has broken off from the body to which it had been attached when still wet enough to take the plastic impressions of the grooves drawn into the body for better adhesion. No slip was used at the joint. Differential shrinkage of the two parts of unequal dryness caused breakage at the joint (C-1981-169).

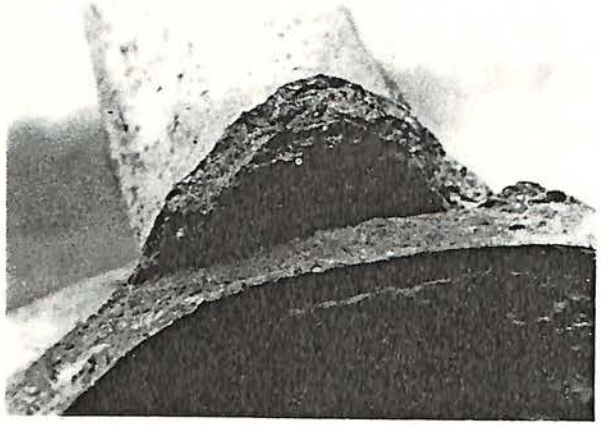


Fig. 23. Upper handle attachment of a fourth-century jar showing break at the neck. There is no cross hatching or scoring, but clay has been added around the handle at the joint (and has broken away at the lower edge of the handle). Note the join of coils on the neck interior that form the rim (arrow) (C-1936-2449).

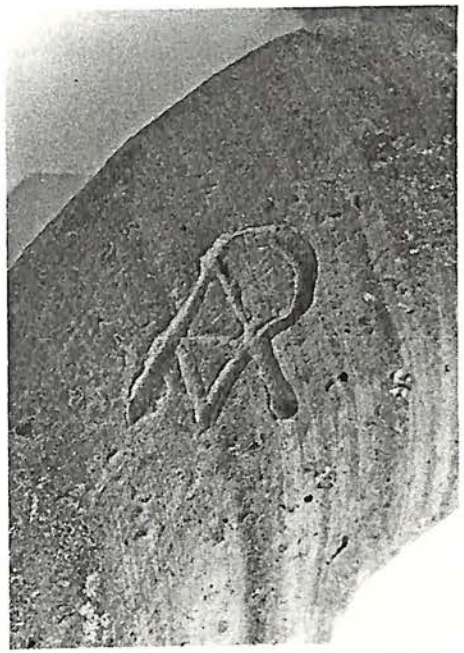
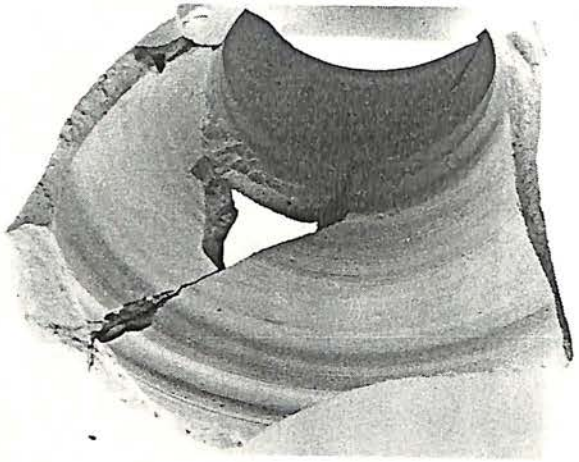


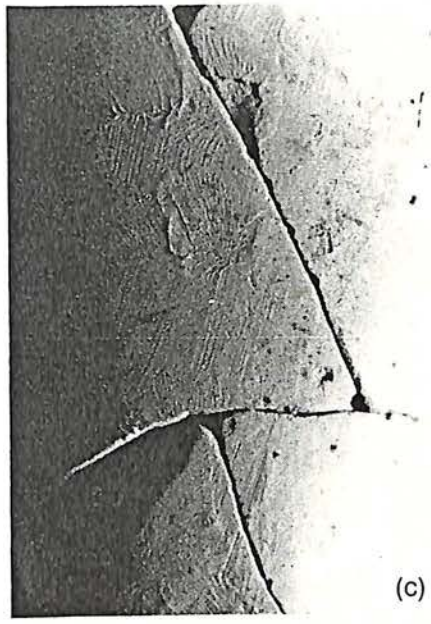
Fig. 24. Stamped monogram (ligature for letters AΔP) on upper flat side of a spined fourth-century handle of Type A′. Horizontal sticky-looking marks in the depressions show that the monogram was impressed with a die, but deepening of strokes where lines finished and rough edges where soft material was furrowed over the edge were made by incising (CP 3167).

In the fourth century, type A handles were stamped or incised once the surface had been finished by wiping (Fig. 24). There was no common or standard way of marking the vessels which might indicate the number or organization of workshops. It is interesting that marks were employed chiefly during the fourth century, the period of the greatest diversity and change in Corinthian amphora manufacture. Handles were stamped with palmettes, incurse monograms, and, rarely, with other devices or symbols, including one pictogram of an amphora. Microscopic observation of details of the impression reveals that most of the handles are stamped, and only a few are incised. Incised lines show striations along the furrow of the incision and clay is pushed up at the edges of the furrow; often the overlapping of strokes can be detected. Stamped impressions, however, have an interrelated mesh of fine ridges at different angles, many of which traverse the furrow. They appear to have had a sticky texture if the clay was wet. At the edge of the stamped impression, the contiguous clay sometimes is pushed up where the stamp has been unevenly impressed. The stamps appear to have been made in a two-stage process, beginning with a terra cotta model which was inscribed freehand and from which the actual clay stamp was made. This is our only clue for the manufacture of dies for these particular marks on Corinthian jars, although terra cotta dies for stamping other ceramics have been found at Corinth.[14]



(a)

(b)



(c)

Fig. 25.(*a*) Shoulder of an early third-century type B jar. Throwing marks in the neck continue over join of the neck to the body and into the widest part of the body (C-37-398). (*b*) Join of neck to body; note the beveled join which overlaps on a diagonal (top). Throwing marks on interior of neck can be seen as ridges and furrows on the inner surface cross section (C-37-398). (*c*) Exterior body showing wet surface where clay was wiped and touched for support (Lot 78-90-12, mid-fifth century type B).

Corinthian Type B: Type B amphoras were made on a fast-turning wheel, as shown by throwing marks on the inside of the wall. In some places, these ridges are quite deep and indicate that considerable force was exerted to raise the cylinder using the centrifugal force of the wheel, whereas elsewhere the marks are shallow and close together, evidence that less force was used to raise and thin the clay wall. In making type B jars the potters worked while the clay was quite wet; lines and marks are stickier or fresher than on type A amphoras (Fig. 25).

The body was thrown right-side-up; the vessel was then inverted and a coil or prethrown section was added to the base and next thrown to a somewhat closed conical form by collaring (Figs. 26 and 27). Rough, circumferential grooves and particles dragged along in the exterior clay surface indicate that a rib was used to close the vessel and form the profile of the toe (Figs. 28 and 29). Indentations just below the widest part of the body show that it was still quite soft when it was picked up and placed in a chuck; three or four indentations around the lower body record how it was held upright while the neck and rim were added. A support, probably made of small, pliable sticks linked side by side, was wrapped around the broad upper body of the type B jars of the late fourth and early third centuries, leaving a characteristic band of shallow

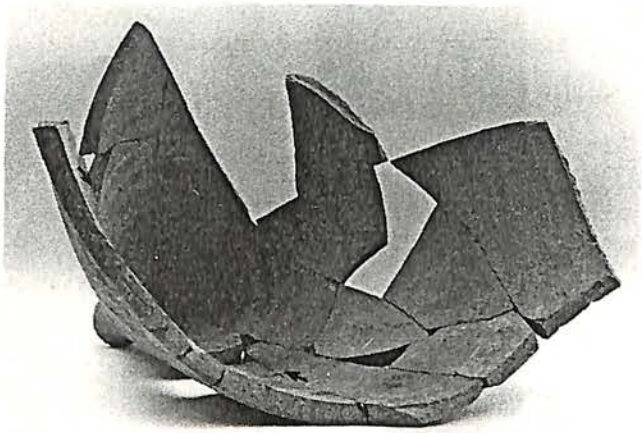


Fig. 26. Interior of fourth-century toe and lower body, showing join (arrows) and turning marks. Here the toe has been added as a cap (C-1975-294).

Fig. 27. Body fragment of the first half of the fifth century from an A′ amphora showing the beveled join of clay near the toe. The join can be seen in the cross section and in the irregularity of the surface. This type of join is also found in both types A and B, although usually not as distinctly (Lot 78-98-12c).

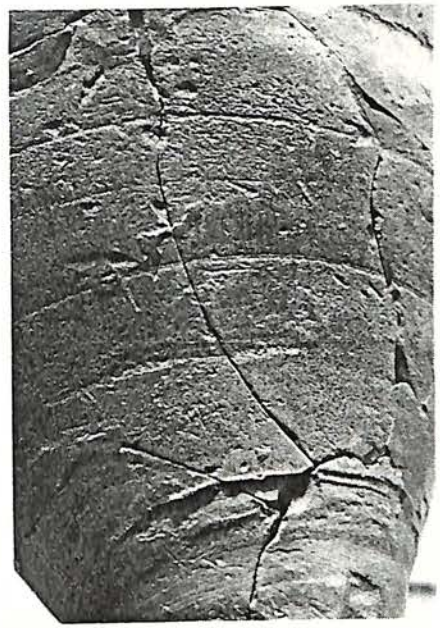


Fig. 28. Ribbing marks on lower part of body of the type B amphora shown in Fig. 5 (C-63-690).

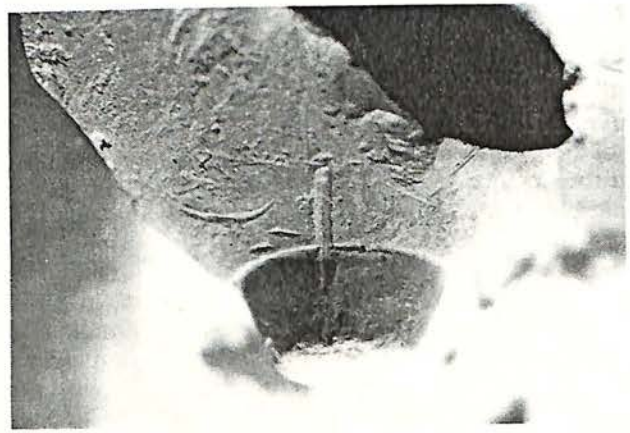


Fig. 29. Ribbed groove that articulates the Corinthian B toe in the fourth century, and ribbed facets in the lower body seen in profile. Such toes are usually capped and occasionally plugged (C-1971-575).

Fig. 30. Impressions of vertical rods (probably wooden sticks or stiff reeds) tied together to support the body at its point of maximum diameter (detail of Fig. 5) (C-63-690).

vertical or slightly diagonal grooves around the maximum diameter (Figs. 5 and 30). The edges of the identations have been obliterated in Fig. 30 by subsequent surface wiping and smoothing. The extent of general use of such a device cannot be determined, because a potter could easily have wiped the surface to remove such indentations. A wetter clay body could be handled with such a device. The advantage of the stick arrangement is that the sticks would have provided more rigidity than a piece of cloth, and the clay body could continue to dry in the interstices between the sticks. The stick belt was probably left in place for part of the final drying period because there often is a mounding of clay at the edges of the stick impressions which could not be easily wiped smooth and which remains as an indication that the clay was somewhat dry when the belt was removed. This ingenious device added strength to the weakest part of the pot, the sharp bend at the shoulder where major stresses concentrate during manufacturing and at the onset of the leather-hard stage of drying where the greatest shrinkage rate occurs. This device also permitted drying and shrinkage as the tension was removed from the ties holding the sticks together as shrinkage began. The sticks adhered to the clay as the body shrank and dried, thus continuing to support the weakest part.

A prethrown cylinder was placed on top of the body for the neck, and the join was sealed by force applied to both sides during rotation (Fig. 31). Throwing ridges start in the upper body, continue over the join,

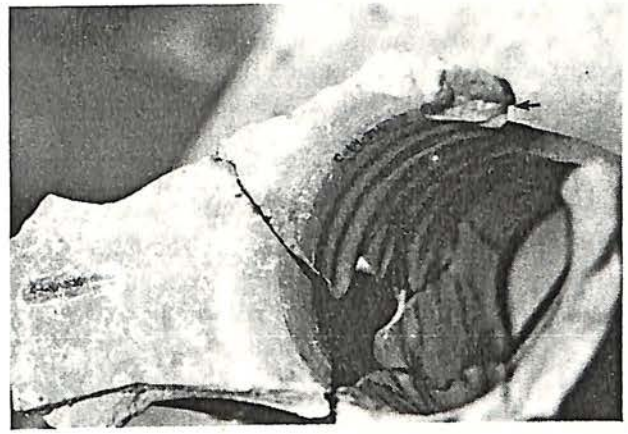


Fig. 31. Upper body and neck of a fourth-century jar showing beveled join of rim to neck (C64-376).

and end in the lower neck, where another set of throwing ridges begins (Fig. 32). Unlike such joins on type A jars, there is very little extension of the bevel. In some cases, where the neck wall is thicker toward the rim, the neck was inverted in being added to the body from its original position during throwing, as clay cylinders are thicker at the bottom and thin to the top when thrown.

Fig. 32. Interior circumferential grooves from throwing and imprints from joining the handle; both show the wet, sticky nature of the clay (C-37-398).

A coil of clay was added at the top of the neck to form the outward-flaring rim of the fifth and fourth centuries, but generally the joins between quite wet parts were so well made that they cannot be seen. In the sixth and third centuries, rolled rims occur. The lip of the cylinder was folded over on itself, and the fold line can be found in a broken cross section. Around the top of the neck on most type B jars, a small ridge or band was set off by grooves made with a rib in the wet clay (Fig. 5).

Handles were formed by pulling out a lump of clay and then bending and attaching it to form a high, arched curve. There are surface indentations found from bottom to top of the handles, which were made by fingers during pulling. In addition, pores and inclusions are elongated in the long axis of the handle and not radially, as in the type A handles, thus offering further evidence of pulling. Type B handles tend to be thickest and are more nearly round in section at the body joint, but at the neck joint are thinner and oval in section. The handle was attached upside-down from the way it was pulled, since the clay extends from a wide lump and thins toward the bottom end during the pulling action. In the fourth and early third centuries, the upper join was made by pressing the side (or broad face) of the handle into the neck wall, which squeezed the mouth to a distinctive oval shape. Often the rim had a small amount of clay removed before it was laid over the handles so it would not be deformed by the handle. Sometimes the shoulder was depressed from the weight of the handle and the operation of joining it. Deformation of the neck and shoulder and the reforming and lowering of the rim are evidence that the clay was worked in a much wetter state than for type A amphoras. The lower attachment on type B handles shows no scoring (another indication of the wetter working of the clay). A coil was added around the base of the handle (Fig. 6), unlike the type A handles in which both ends of the handle, as well as the spine, were built up by additions of small bits of clay.

Thus far, we have shown that the two stylistic variants have very different methods of manufacture within an overall sequence of construction which is the same for both types. Throwing is a more rapid method of forming clay than hand building, so that in a given work period more parts could be thrown than hand built. Joining the parts of the type B amphoras in a wetter condition also meant more rapid production. Thus, more vessels were made in a single sitting or work period. This conclusion is borne out by our experience in which 5 to 7 hand-built jars were made by one person working one day, whereas 10 to 15 jars were thrown and joined in the same time.

Corinthian Type A′: Type A′ amphoras were handmade when production began early in the fifth century, but fast-wheel techniques appeared at the beginning of the third century. The hand-built bodies of the fifth century occasionally have diagonal ridges from shaping and, sometimes, sizeable impressions on the interior from pressure by fingers, palm, or fist. Shallow concentric ridges and grooves in a circumferential pattern occur on one of the earliest examples of type A′, indicating that it was probably made on a turntable. These grooves were probably caused by a finishing operation, rather than being the result of throwing, because the shallow grooving indicates that little force was used. Often the lower

body joint is higher up the body, as much as 180 mm from the bottom. The capped toe was shaped on the exterior with a rib that in some cases gouged grooves around the lower body. The rib was also used to incise a groove around the top of the toe for articulation of the join with the body.

Necks were made by hand for A′ jars of the classical period, although shallow turning marks on the interior of fifth-century amphoras indicate the use of a turntable (not a fast wheel) for necks as well as for bodies. After the fourth century the neck was thrown on a fast-moving wheel, as revealed by deep turning marks on the interior and by fine diagonal ridges that result from twisting the top of the cylinder relative to its bottom while rapidly stretching it up from the lower part of the neck. Such twisting is much more common in A′ than B amphoras, but is not found in A jars. No evidence of scoring was found at joints, nor is there a large overlap of the neck with the body at the joint.

In the fifth century, the heavy, sloping rim was coiled. Later a relatively large, carefully preformed rim was added to the neck and joined in cross section like an inverted "V" over the neck. On the inside, this join is usually easily seen and occurs about 60 mm from the top of the jar, and below the lower edge of the rim on the outside of the jar. In some examples, the upper neck is considerably thickened. The consistently inverted placement of prethrown cylinders on the necks of types A′ and B and the intentional thickening of the rims suggests concern by potters for the structural integrity of their pots during extended use; both would have decreased the chance of breakage. Manufacturers of modern glasses and flower pots also thicken rims to avoid breakage.

Handles on A′ jars were rolled in the fifth century, but pulled in the third. In the early fifth century, they were flattened from side to side at the top like those of type A, but by mid-century they were round in section, with the greater diameter at the top. At this time they were joined at right angles to the neck with an extra lump of clay applied between neck and handle, thus requiring two joins. Fingerprints are often present on the added lump, which presumably was wetter than the handle or neck. In order to join the broad, sloping fifth- and fourth-century rims to the handles without deformation, a chunk under the surface of the rim was cut out, as was done with type A amphoras, and then the rims were pressed down onto the tops of the handles.

In summary, the marks and imprints on Corinthian amphoras are direct evidence of the stages of manufacture, and a technological typology has been established for A, A′, and B amphoras made at Corinth. Types A and B were made by different processes which are technologically distinct. The type A′ was completely handmade in the fifth century, and transformed gradually to being wheel thrown by the third century B.C. The technology of A and A′ amphoras represents a series of small incremental changes which, although gradual, were deliberate. We suggest that there was a shift at the beginning of the fifth century in the adoption for type A′ of the fine yellow body resembling that of type B that first distinguishes the type A′ from type A. Second, the type B throwing methods were incorporated into types A and A′, beginning with the thrown neck in the fourth century. The A′ continued to undergo changes in the forming of rims, handles, and toes. The two types A and A′ repre-

Table II. Capacity and Weight Measurements

	Capacities (liters)	Weight Empty (kg)	Weight Filled with Water (kg)
Type A	31–70 (sample of 100)	9–15 (sample of 5)	40–85
Type B	20–28 (sample of 75)	6–9 (sample of 7)	26–37

sent a series of continuous technological changes occurring in the fourth and fifth centuries B.C.

The Relationships between Design and Function

From their earliest production and throughout most periods of manufacture, all three Corinthian amphora types were shipped abroad, primarily to settlements in Sicily and Magna Graecia, but also reaching the western Mediterranean, North Africa, and the regions around the Black Sea.[4] Certain of the changes in shape, even those that evolved gradually, were influenced by practical considerations of handling and lading. For example, the broad toe of the seventh-century B.C. type A amphoras narrowed in the sixth century until it could be grasped easily in one hand. In the fifth century the toe narrowed further and was offset from the body, giving an even better grip. The knob that developed in the fourth century was joined to the body by a short "neck" that could easily have been wrapped with a rope for control and ease in lifting.

The potters, mindful of the jars' considerable size and weight, adopted designs that optimized transport. Type B amphoras held from 20 to 28 liters; full of water they weighed 60 to 85 pounds (26–37 kg), as shown in Table II. When full, they could have been managed by one person. Corinthian A jars held 31 to 70 liters, and their weight when filled would have ranged from 90 to 190 pounds (40–85 kg), as shown again in Table II. Moving these heavy jars usually would have required two people, and a means of roping the jars securely. With most of the type A and A′ jars the lower edge of the rim was in line with the inner arch of the handle, which may have allowed the jar to be tied at the top of the neck through the handles, for lifting or tipping them in place. Thus, the load would have been spread over the neck and handles.

The heavy rim on early type A amphoras would have offered another handhold for moving the jars; its heavy, wheel-shaped handhold provided the moment to rotate the jars. When empty, the top-heavy type A jars could have been stored securely upside-down on their rims. The design of the handles with the thickening through the upper part may have been adopted in the second half of the seventh century to form a bridge along which the jar could be shifted when inverted. The edge of the rim and toe were beveled or rounded to deter chipping.

Shortening of the type A bodies and rounding of their lower part in the sixth and fifth centuries not only compacted the load, but also made it easy to roll the amphoras when full and to tip them when dispensing contents because the center of gravity and center of mass were located on a level with the maximum diameter. In the fourth century, type A jars could have been rolled on the slight bulge often found on the lower body. The breaking strength of the fired clay wall, measuring about 5–12 mm thick, is sufficient to withstand the stress of rolling a jar weighing as much as 85 kg.

The elongation of the shape which occurred in type B amphoras probably was related to the greater ease with which one person could lift an ovoid jar by keeping the center of gravity close to his or her body. Type B jars have a high center of mass, a long neck for balance, and a toe for gripping, all of which increased ease of handling. The mouth, oval in plane section, with its flaring rim, sometimes indented on the two sides with handles, would have been practical for pouring.

Inferences about design and handling can also be made by observing wear, breakage, and mending. Pointed containers wear at the toe. Such abrasion is most often noted on the toes of Type A, an indication that they may have been reused. This wear was counteracted by pressing extra sand and grog into the resting surface of some toes. Most amphoras had a point of impact where fracture was initiated on a flat area in the lower body; some other points of initiation of fracture were near the toe or at the widest part of the body, all of which are areas of structural integrity. Impact often caused further breakage at fabricated joints, particularly where some defect, such as a large inclusion, shrinkage crack, or very thin wall, was present. The potters intentionally increased the strength and longevity of their jars by thickening the body wall near the base, by making the rim and upper neck thicker than other regions, by overlapping or beveling joints rather than using butt joints, and by adding extra coils of clay at handle attachments. Additional strength was gained by joining rims to the handles, as occurred on A and B amphoras in the fourth and early third centuries. Such joins were apparently quite strong since only exceptional fragments have breakage along joins. The rounded type A body profiles and the curve at the maximum diameter of the type B amphoras form arcs of circles in profile and thus function to distribute the static and dynamic loads. This regular curvature without flat or pointed areas would have helped to spread the shock of an impact. Some transport amphoras from Corinth and other cities lasted a number of years; evidence for the mending, and thus reuse, of amphoras consists of lead plugs and patches, and the rare occurrence of drill holes.

There is no direct evidence of jar sealing or stoppers, but inferences can be drawn from the shapes of rims and necks. Corinthian A, A′, and early B amphoras curve in slightly at the rim and so were probably sealed at the top. In the thrown necks which flared at the top, a stopper might have been fitted inside. Type B amphoras with a figure eight opening from the fourth and first half of the third centuries could have been sealed with either a plug or cap which covered the rim.

This study suggests that design constraints were placed on the potters by the function of the amphoras and reveals some of the solutions: how each type could have been maneuvered by rolling, rotating, lifting; how they could have been carried and tied in place; or where stoppers could have been sealed. We infer the deliberate choices potters made about shape and construction in order to meet the practical needs of handling the jars and to ensure their longevity.

Table III. Percent Weight Gain, Time to Wet Through, and Hardness as Indications of Porosity and Permeability

Corinthian A Weight gain 9.7–13%	(10 samples) Impermeable in 24 hours	Mohs hardness Red surface 3 1/2–5 Gray interior 5 1/2–6
Corinthian A′ Weight gain 13.7–20.1%	(13 samples) 8 permeable in minutes (12–35) 5 permeable in hours (1–6)	Mohs hardness 3–4 surface and interior
Corinthian B Weight gain 15.4–28.3%	(13 samples) Permeable in minutes (9–31)	Mohs hardness 3–4, surface and interior

Results of Investigation of Properties

Type A amphoras are impermeable to water, oil, and wine when allowed to stand with a continuously fed reservoir of liquid on the inner surface of a curved sherd for one week. Type B amphoras are porous in 9 to 31 minutes, as shown in Table III and Fig. 33. When the sherd wets through to the underside, the clay body darkens at a small central wetted spot. The results are mixed for the type A′ amphoras, as would be expected, if the wheel-forming methods and composition of type B jars were being used to modify the production methods of type A. All of these walls had average thicknesses of 10 to 15 mm. Other properties such as porosity and Mohs hardness reinforce the observations of composition, microstructure, and measurement of the time to wet through the

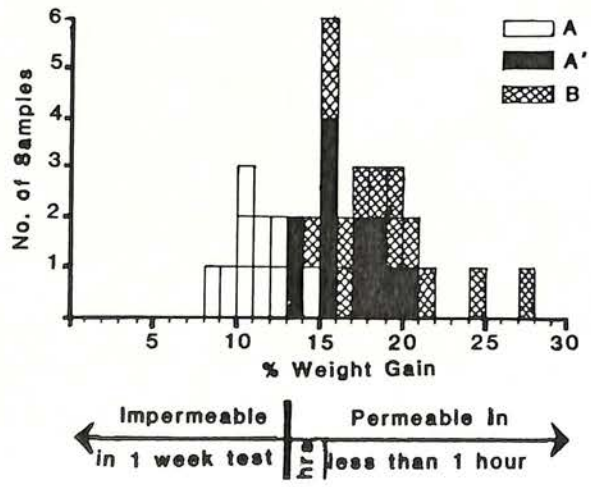


Fig. 33. Histogram comparing results of percent weight gain of water when sherds were boiled one hour and allowed to sit 24 hours (top) with measurements of time to wet through a sherd having a 12–16-mm thick wall.

Table IV. Density and Average Equivalent Pore Size

A	Surface	2.95 g/cm^2	0.015 μm
	Interior	2.74 g/cm^2	0.033 μm
B		2.42 g/cm^2	0.35 μm

wall as an indication of impermeability. Table III was formulated in the field; the porosity was crudely measured on 10 to 13 sherds of each variant as the percent weight gain by open pores after boiling for one hour and allowing the sherds to sit in water overnight. Some of the B values are particularly high, when one multiplies by a factor of 2.5–2.7, average values for the densities of earthenware, to obtain an estimate of the apparent porosity. This may be due in the two cases in Fig. 33 to the presence of microcracks in the body or possibly to weathering.

In the M.I.T. Ceramics and Glass Lab the samples of mid-fifth century A and B amphoras were submitted to porosity measurements using a mercury porosimeter, the results of which are shown in Table IV, again corroborating the finer pore sizes observed in the type A amphoras, and here shown to be smaller on the average by a factor of 20 than in the type B amphora sample. Although one might presume that in a smaller capillary there is a greater pressure for capillary rise, and thus water or oil should wet through the wall of the gray core faster than the red surface layer or type B walls, there are fewer and smaller pores and many are closed, particularly where fine-scale bloating has occurred. Some bloating of the interior gray core is shown by a density lower than that in the outer red layers.

Thus, there are significant differences in the properties of these visually and technologically distinct amphoras. This is probably why Corinth developed more than one amphora type for storage and export. Properties such as permeability, strength, density, hardness, and porosity characterize these types.

Reconstruction of Technology from Investigation of Microstructure

Locally available unfired clay was compared with the fired clays from type A, both the gray core and red outer layer, and with type B. Figure 34 shows two magnifications of the unfired, lignite quarry clay as it was found, one taken with a scanning electron microscope at x 1000 and another at x 10,000. The microstructure is quite homogeneous and consists of agglomerated clumps of fine platey particles ranging in size from 0.5 to 5 μm. There are no large calcite or dolomite inclusions, but the calcium oxide appears to be extremely finely divided and well integrated into the clay structure, a factor which would promote glass formation on a local scale and which would explain why there is almost no spalling of the Corinthian fired clay bodies even though a temperature greater than the decomposition point of calcite (that is, greater than 800°C) was found in the refiring tests. The estimates of original firing temperature for the ancient ware, given at the bottom of Table V, were made using scanning electron microscopy to detect changes in the body microstructure on refiring in increments of 100°C. These estimates are within 50° of the firing temperature. Thus, the firing temperatures for the Corinthian type A and

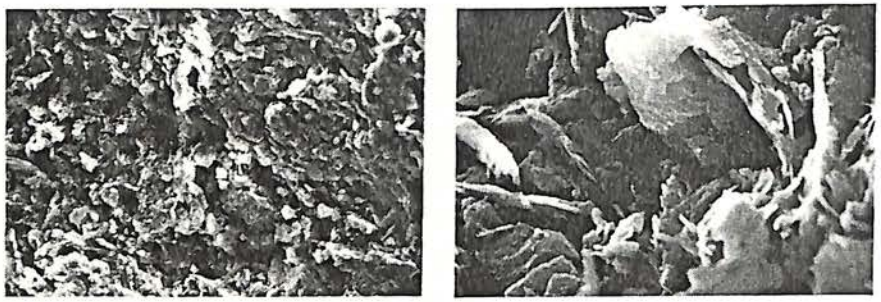


Fig. 34. Scanning electron microscopy micrographs taken at x 1000 (left) and x 10 000 (right) showing the platey microstructure of raw clay from the lignite quarry which was shown to be a calcareous illite by differential thermal analysis, having a particle size of 0.1 to 5 μm and agglomerates 20–50 μm in size. This clay was used to make replicas.

Table V. Compositions of Mid-Fifth-Century Corinthian Amphora Types A and B, Lignite Quarry Clay, and Slip by Energy Dispersive Microprobe Analysis

	Type A (No. 1983-1-1)			Type B Body (1983-1-2)	Lignite Quarry Clay	Iron Red Slip on 4thC A
	Surface	Red	Gray			
SiO_2	50.05	49.41	48.15	44.96	51.36	48.34
TiO_2	0.76	0.67	0.63	0.62	0.55	0.77
Al_2O_3	21.69	25.71	26.33	14.55	18.65	23.98
CaO	8.90	9.96	8.64	25.34	11.52	6.40
MgO	3.14	2.94	3.05	2.75	4.47	3.28
FeO	6.74	6.94	7.72	5.04	6.45	10.72
K_2O	5.37	3.33	3.55	1.51	1.45	3.43
Na_2O	0.98	0.74	0.78	1.14	1.37	0.92
Cl	0.10	0.13	0.15	0.07	0.17	0.07
SO_3	0.07	0.10	0.08	0.08	1.20	0.39
Total	97.80	98.96	97.95	96.08	97.20	98.28
$\frac{Al_2O_3}{SiO_2}$	0.42	0.52	0.55	0.32	0.36	0.50
No. of Analyses	6	8	8	8	6	6
Firing temp. estimates	1000°C	950°	1000°	900°	(1050°)	1000°

Standards included quartz, anorthite, microcline, fayalite, anatase, hornblende, and other geological standards of known composition and proven reliability used by Hoffman Labs Microprobe Facility. Hornblende and an M.I.T. glass standard were analyzed before and after the run to check possible instrument drift.

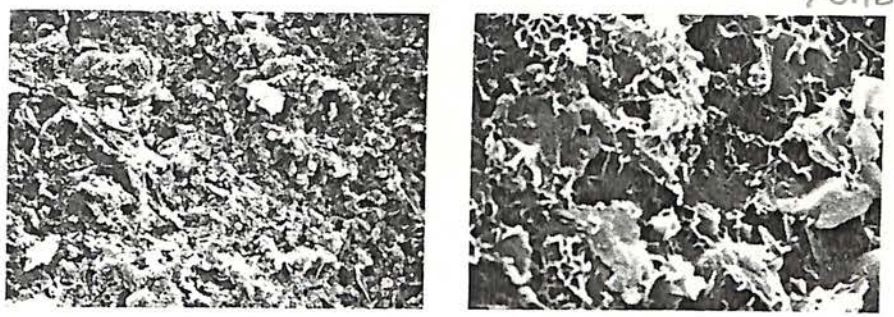


Fig. 35. Scanning electron microscopy micrographs taken at x 1000 (left) and x 10 000 (right) of fracture surfaces showing the vitreous microstructure of a Corinthian A gray core (same sample as shown in Fig. 4).

B bodies were quite similar. The raw and fired clays both effervesce in dilute hydrochloric acid and, in fact, no clay deposits were found near Corinth which did not have a strong reaction to dilute HCl. The highly calcareous nature of the clays near Corinth caused M. Farnsworth[5] to reject them as possible sources, but it is the state in which the calcium is present in the clay that is important to its firing behavior. Differential thermal analysis shows the clay type to be illite, and X-ray diffraction reveals the presence of calcite and quartz.

In the fired clay microstructures taken at the same magnifications as the unfired clay, the glass formation is most extensive in the gray inner core of the type A amphoras (Fig. 35). The pores are larger and there is much less interconnection between neighboring clay platelets in the red surface layer of type A amphoras (Fig. 36); in type B amphoras there is more porosity and the pores are larger than in type A (Fig. 37). The type B amphoras most nearly resemble the unfired clay and have the least amount of glass formation, which corroborates what the chemical composition reveals, namely a lower potassium content, less fluxing action, and less glass, given a similar firing temperature.

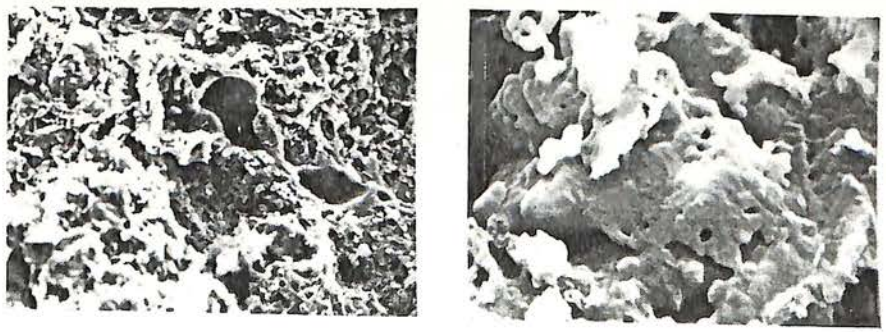


Fig. 36. Scanning electron microscopy micrographs taken at x 1000 (left) and x 10 000 (right) of fracture surfaces showing the less dense surface layer of a Corinthian A red outer layer (same sample as shown in Fig. 4).

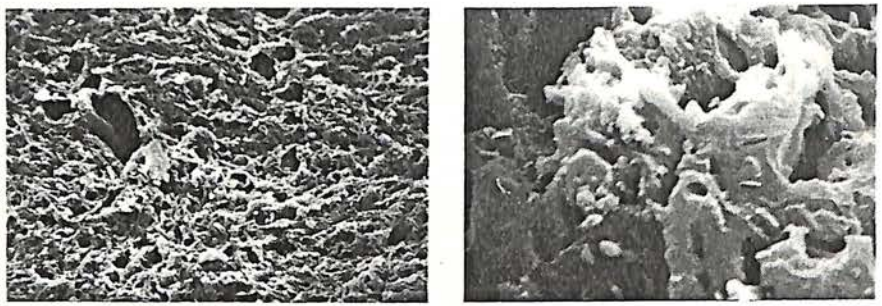


Fig. 37. Scanning electron microscopy micrographs taken at x 1000 (left) and x 10 000 (right) of the porous fracture surface from the bulk of a type B amphora (same sample shown in Fig. 4).

The sequence of firing which formed the microstructure found in the type A amphoras consists of reduction to form iron in the reduced state (which is gray) followed by oxidation (which yields oxidized red iron oxide), as is well documented in the ceramic and archeological literature.[15–18] If the ware is oxidized in the later stages of firing, and if the reduced iron is not held in reduction in a glassy matrix, the ware will turn red. In the type A amphoras, the early part of the firing in reduction was carried out with a rapid rise in temperature to ensure the formation of an impermeable inner core in the wall of the amphora. Reduced iron oxide would have acted as a flux to help in the formation of a glassy bond, as would the presence of finely divided calcia and potash, which had been distributed at contact points of the clay particles during drying of the last residual water from the body. Then the firing slowed and light oxidation was used to increase the temperature of the kiln, to redden the exterior of the body, and to continue the reactions causing formation of glass on the interior of the body.

There are examples of overfired, bloated and warped, predominantly gray amphoras. One such complete amphora was evidently used in spite of warping because it was excavated at the bottom of a well in Nemea. This amphora was certainly impermeable and would have been well suited for transport. Often Corinthian tiles are overfired, gray with a yellowish surface, and bloated, but they are also impermeable to water, a desirable property for a roof. Thus, there is direct evidence that impermeable objects were made and used which by our modern standards would be considered overfired, and that these products were made by reduction firing coupled with high-temperature oxidation firing.

The variation in composition of the fired clay bodies for the type A and B amphoras as well as for the iron-rich red slip on a fourth-century type A amphora was determined using electron beam microprobe analysis in energy dispersive mode (Table V). The orange surface, red layer near the surface, and the gray interior core were studied, as well as a sample of clay from a lignite quarry near Pentascoufi village, several kilometers southwest of the Corinth excavations, which was used in the replication studies and which had been fired to 1050°C. Each sample was

analyzed six to eight times. The average of these analyses is reported for each sample. As a result of porosity in the body, the totals are lower than 100%. Because it was necessary to sample a large area free of inclusions to obtain a representative clay composition, measurements were made of areas 40–150 μm long and viewed simultaneously with backscattered scanning electron microscopy to be sure areas were free of large inclusions which would alter the results. The values for Al_2O_3 and SiO_2 are accurate to ±5% of the mean, whereas the values in the 5 to 10% range are good to 10% of the mean, and the values near 1% can vary ±20%; with wavelength dispersive microprobe these values would have been less but the totals would have been lower because of the difficulty in obtaining an optically flat sample free of porosity in such a soft material. The iron oxide is reported as FeO, even though a mixed oxidation state is present in the material, because the microprobe technique cannot distinguish oxidation states.

Thus, the significant differences between types A and B are the CaO, FeO, and K_2O variations, and the Al_2O_3:SiO_2 ratio. The type B body contains considerably more calcium oxide and less iron and potassium oxide. However, the ratio of alumina to silica is not the same, indicating a dissimilarity of basic clay substance or difference in the amount of quartz temper. The lignite quarry clay used in replications has an alumina:silica ratio similar to that of type B, and is a reasonable facsimile to the type B amphora clay. However, the high sulfate content might cause difficulty in firing because of its tendency to become entrained in the body and to cause bloating. In addition, the potassium content is low in the type B body and lignite clay, and is such that formation of a glassy phase in the body would not be promoted at the lower firing temperature and oxidizing atmosphere. That potash was added to the type A body is reinforced by the occurrence of a K_2O-rich effloresced layer at the surface, indicating that the K_2O is present as a partly soluble salt and not solely within the clay substance. The presence of this so-called self-slip is shown by the light orange surface coloration, which has been investigated by Matson.[9b] M. Tite has suggested that the type B clay might have been levigated as in slips for Attic wares[18] to produce the type A body, in which case quartz and calcite inclusions would have settled out, decreasing the amounts of SiO_2 and CaO, and increasing those oxides related to clay substance, presumably Al_2O_3, TiO_2, K_2O, and FeO. If we ratio the concentrations in the type B body to those of the type A, the results would be expected to be similar, but they are not: % Al_2O_3 in type B/% Al_2O_3 in type A = 0.57; for TiO_2, 0.93; FeO, 0.73; K_2O, 0.45; Na_2O, 1.54; MgO, 0.84. MgO could be present as dolomite lime (and thus decrease) or in the clay (and thus increase) but there is no substantial change. Thus, we find it likely that at least two different clay sources were used, and that one was not derived by levigation from the other. Two other concerns reinforce this conclusion. One, a great deal of clay would have had to be levigated. Second, there is no cut-off in the size of quartz particles, as would be expected if levigation had been carried out. If we contend that at least two different clays might have been used, we find that it was not necessary to blend clays, as the lignite clay was used successfully in replication studies without blending; that is, there is no substantive disadvantage which must be overcome by blending. The

shrinkage, working characteristics, distribution of particle sizes, and firing behavior do not need improvement.

Two clay types, both calcium-containing illites, are found in type A and B amphoras, and the firing temperatures are in the same general range for both types, those of type A being consistently above those of type B. Type B is a lignite bed clay which is very high in finely divided calcium oxide. When fired, a porous, low-density, permeable ware results without spalling. Type A is an illitic clay with lower calcium which contains high potassium because of a potash addition and, when fired, results in a high-density body with lower porosity and permeability. Differences in the details of the firing cycle and the addition of potassia-containing salts, probably potash, to the type A clay body are responsible for the finer pore size found in the microstructure. Thus, there was an intentional effort using both composition and firing progression and atmosphere to control the finer pore size found in the type A amphoras. It is interesting to note that the same firing progression and chemical compositions used for later Athenian painted fine wares, black-on-red and red-on-black, were prefigured in the technology used to manufacture Corinthian amphoras.

Conclusions

The Ceramic Complex

The ceramic complex is the whole of those activities, traits, values, and objects related to the making of pottery and other clay artifacts, including (1) the conventions of vessel shape and function, design elements, and surface treatment and manufacturing methods; (2) the material repertoire, including clay type and properties, temper, decorative materials, and the conventions of their preparation and application; (3) the level of chemical technology; and (4) the firing technology, as well as (5) the conventions which govern quality, use, reuse, and value. From a technological point of view, this ceramic complex includes clay preparation, forming and decorating technologies, and chemical and firing technologies. To determine the nature of this ceramic complex at any one time and place and to detail the pattern of change requires developing a technological typology with proper reference standards. We have done this for pottery production methods of Corinthian amphoras by replicating the macrostructural surface and cross-sectional textures as well as whole vessels, and for microstructural features by using local clays as references and by firing them, as well as by refiring amphora sherds which display a range of composition, firing, and atmosphere control.

We have shown that the three types of Corinthian amphoras can be distinguished using technological as well as stylistic criteria. To understand the technology of pottery manufacture, three sets of criteria can be examined: (1) those aspects of substance and appearance which are controlled by the use of clay as a material, (2) those aspects which the potter chooses or employs as methods or techniques in the manufacture, and (3) those aspects which are designed into the pottery by either potter or user, or both, so that the pottery, by its shape, weight, strength, and capacity, best serves a particular function. All of these criteria can be translated into physical characteristics which can be observed in the pottery as structure, texture, and color, and which can be related to physical and chemical gradients in the material as well as to their function. The calcareous; illitic clays of Corinth have particularly long working characteristics over a range of water content which influenced manufacture. The same Corinthian amphoras could not have been made with a short-working, refractory Chinese kaolin or china clay, nor with a well-fluxed Near Eastern montmorillonite with a high drying shrinkage. Each pottery tradition represents a unique solution to these concerns within its own historical, technological, and social context.

A Production History of Corinthian Amphoras

Corinthian amphoras provide an ideal case study for many reasons: they are numerous, have well-established excavation contexts, and have been grouped stylistically into three morphological types. They are large and require skill to make; they display complex manufacturing methods. Their general utilitarian nature is understood; it required that structural design be thoughtfully considered to optimize their handling. Their use to transport bulk commodities prescribed that the vessels must be as strong as possible to prevent breakage and yet as light as possible for ease of transport and to maximize the amount which could be shipped. These vessels were designed to be handled conveniently; they had to be sealed, stored, transported, emptied, and refilled. The mechanics of such operations as lifting, rolling, and tipping were taken into consideration in studying their design and manufacturing technology.

We have a clear description of the manufacturing processes for Corinthian amphoras and a pattern of their change with time, i.e., a production history for this particular vessel type at Corinth. Analysis of this ceramic complex has offered a means other than stylistic analysis of distinguishing types of amphoras. This study derives its methodology from the materials science paradigm in which structure, properties, and processing are investigated as interrelated elements necessary to the understanding of ceramics. We have established a technological typology and found that it covaries with the established stylistic typology. Further, an understanding of the ceramic technology allows us to reconstruct the way in which potters designed the properties of their wares, evaluating the constraints of raw materials, the methods possible for altering or enhancing them, and the requirements of the market for finished containers.

This study suggests that design constraints resulted from functional considerations. For example, in the type A amphoras we have a truly outstanding product: an impermeable, small-necked shipping container, about the size one person (or sometimes two) could handle by rolling or lifting. To achieve impermeability, potash was added to flux the calcareous, illitic clay and the ware was fired rapidly in reduction to promote formation of a glassy phase, or interior barrier layer. The formation of a glassy phase meant that warping and bloating were common, and the solution to producing amphoras with a low rejection rate was to add sufficient temper, up to 20 vol% in a composition similar to that of the clay body, so that a composite body was formed which resisted deformation, cracking, and thermal shock during firing. The benefit to be gained by impermeability outweighed the disadvantage of being unable to throw on a potter's wheel a body averaging 10–20 vol% of sharp, angular inclusions and for a time a slower means of forming by hand building was found acceptable.

We have isolated the details of a conservative technological tradition with two ways of producing transport and storage vessels for two quite distinctive purposes in types A and B. The technology and design were specifically altered in incremental steps to produce particular properties, which shows that Corinthian amphora potters responded to the needs of the marketplace. In the production of type A′, we find a modification of type A to the more rapid manufacturing processes of type B, with retention of some of the properties of the type A amphoras. Thus, we have documented a complex, sophisticated technological tradition as well as some of the technological changes in this particular ware, and we have shown that the stylistic criteria used to classify these vessels are based on real technological variations.

Evidence of Workshop Production

In studying Corinthian amphoras, we have found evidence for a workshop level of craft production which goes beyond the criteria usually cited to establish such organization, which include uniformity of ware, a sophisticated or complex level of technology, the presence of potters' marks, or the excavation of a workshop complex. Here we find a pattern of production which gives circumstantial evidence for a workshop model of manufacture. The ware is not particularly uniform, as shown by measurements of dimensions and capacity. However, there are recurring sequences and methods used in manufacture, a high level of control in managing composition, forming and firing variables which imply a sophisticated understanding of ceramic technology, and evidence that the design was made and refined for functional reasons (improved handling, shipping, carrying, and reuse). Further evidence of workshops is the pattern of diversity of shape, decoration, and manufacture within the tradition. We have supported the contention that multiple jars were made at one time. There is evidence of each process of working the clay at different stages of dryness with a sufficient regard for surface finish that the jars are pleasing and utilitarian without being perfectly symmetrical, without having walls of even thickness, or without the excessive attention to surface detail required of a fine ware. No self-conscious attempts to cover up production marks were found, and there is ample evidence that a variety of corrective measures were taken when drying proceeded too far. We suggest that potters were working at the limit of their ability to produce, and that we find what David Pye[19] calls a craftsmanship of risk. Corinthian amphora potters had a degree of familiarity with the materials and their properties and were able to optimize each operation without spending excess labor on joins or surface finish, levigation and blending of clays, or firing. Within the general uniformity of manufacturing technology which spans several centuries, there is technological innovation which is pronounced during some periods, and a continuous tradition of experimentation with minor details of the jars, having roots in such areas as problems in manufacture, individual preference, and functional design. We conclude that there was a conservative tradition, but one which was open to modification and change.

The pottery of a seasonal specialist who produces a few pieces for home consumption or local sale would not display the same pattern of controlled variation. In such a case, there is greater diversity within the functional type, and a lesser degree of control over the technology. The level of complexity of the technology is lower, and the pottery lacks immediacy or excellence of execution. Certain aspects of the crafting process are overworked, and certain aspects of the ceramic technology are not optimized in a very conservative tradition in which there is an unwillingness to experiment, as has been shown, for instance, in Neolithic software production in the Iranian highlands.[20] The only ethnographic example of which we are aware where storage pottery comparable to Corinthian amphoras is produced and which has been studied for sixty years comes from the Sudan.[21] The production methods, observed in 1922, 1939, and 1978, include the inversion of vessels to form thin-walled bases. The Sudanese practice lacks the type of variation inferred for Corinthian amphora manufacture. Although the technology is conservative, it lacks the fine-scale experimentation of Corinthian amphoras, and the production requires less risk as well as less technological sophistication.

Possible Explanations for the Change in Properties

The Corinthian potters made deliberate choices about materials, shape, and construction in order to produce particular properties to meet the practical needs of handling and storage. In the type A amphoras, a stable technology was maintained during the seventh and first half of the sixth centuries, when Corinth was a major trading center. Surprisingly, within the following fifty years, the amphoras then became more permeable and manufacture changed to incorporate wheel methods. First, a second type was introduced, the wheel-made, permeable type B, and soon after the A′ variant was produced, indicating a change in clay body from that of type A to that of type B. This change was followed by throwing of the neck on A and A′ in the fourth century and later by the incorporation of other wheel methods, illustrating the gradual and incremental way in which technological change took place.

We still cannot say why Corinth diversified its production of amphoras in the fourth quarter of the sixth century when type B jars began to be manufactured and exported. Impermeability was still important, as shown by the linings of pine resin found inside a number of type B jars (Curt Beck, personal communication). Perhaps a new commodity was being shipped, which needed a distinctive container to connote contents different from those carried in type A jars. Perhaps these contents were particularly appropriate for use with a resinous lining, as, for instance, wine. In any case, the fast-wheel technology was adopted wholesale for the new shape, perhaps because it allowed greater efficiency of production.

The need for impermeable type A amphoras remained, however, since their manufacture continued alongside that of type B. In the fifth century their numbers declined as type A′ appeared, again for reasons that are unclear. The use of a yellow clay for A′ suggests influence from type B but it was nearly a century before the fast wheel was introduced for throwing parts of A and A′ jars. There are three notable points about jars of type A′. First, they were more permeable than jars of type A but so far no trace of an organic lining has been found, which suggests a change in contents, perhaps to a dry commodity such as nuts, dried fruit, or grain. Second, they are found abroad in considerable numbers and,

once they were introduced, type A jars remained primarily at home in Corinth, as if A′ took over the function of export container. (If A′ vessels shipped the same contents as type A jars had earlier, and impermeability was essential, a lining as yet undetected may have been used.) Third, type A′ bodies are ovoid rather than spherical, which may have made them easier to handle than the massive type A jars—although if this had been the sole reason for the change, type A would not have continued in production for two full centuries longer. Perhaps the different shape once more distinguished different contents.

We find a remarkable combination of continuity of tradition and ability to branch out in the Corinthian ceramics industry, even if the reasons for the technological and stylistic changes cannot be precisely detailed. Corinthian potters seem to have been responsive to changing needs of the marketplace; they may also have been reacting to changes in the sources of raw materials, or to alteration in economic and social organization. Our general conclusion is that, with a change in social and economic organization, we find a change in technology but we cannot sufficiently detail the nature of the change to determine the driving forces for it.

Acknowledgments

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