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THE INTRODUCTION OF THE MOLDMADE BOWL REVISITED

TRACKING A HELLENISTIC INNOVATION

ABSTRACT

The date of 224/3 for the introduction of Hellenistic moldmade relief bowls at Athens is reexamined—and subsequently reaffirmed—in light of a recent downward shift in the chronology of Rhodian amphoras. The process of introduction is traced in detail, using a model of the innovation process based on recent inventions. The implications of the stratigraphic record at the Athenian Agora for our understanding of the introduction of innovations in general, and of this innovation in particular, are discussed. The sparse representation of the moldmade bowl in later 3rd-century deposits may indicate slow acceptance of the new type, but more likely reflects the time that it takes for objects to enter the archaeological record.

INTRODUCTION

The hemispherical moldmade relief bowl, familiarly known as the "Megarian" bowl, is one of the most useful ceramic dating tools of the Hellenistic period.[1] The product of a radical technological innovation, it cannot be confused with earlier pottery. Furthermore, because of the relief decoration that covers its exterior surface, it can be identified even in small wall fragments. The date of its introduction on any one site, then, is of particular interest; the more closely we can pinpoint it, the more accurately we can date strata that were laid down in the years just before and after that event.

Over 20 years ago, I proposed a date in the span 240–220 for the introduction of the moldmade bowl at Athens, positing 224/3 B.C. as the most likely year in that span; recent revisions in the chronology of Rhodian amphoras—a type of artifact often found in association with moldmade bowls—now require a reevaluation of that date. It is also appropriate to review that hypothesis in the light of more recent scholarship on the relationship between metalwork and ceramics, and of discussions of the process of innovation itself.

1. I am grateful to Gérald Finkielsztejn and Mark Lawall for comments on an earlier draft of this article. All photographs were provided by the Agora Excavations.

HISTORY OF SCHOLARSHIP

Moldmade bowls have attracted scholarly interest since early in the last century, and chronology has been the subject of ongoing discussion and revision. Fernand Courby, who devoted a large part of his 1922 monograph on relief ware to the type, placed its invention at the end of the 4th century, on the basis of both stylistic and contextual considerations.[2] Systematic analysis of Hellenistic contexts at the Athenian Agora was to suggest revisions, however. In 1934, Homer Thompson published the contents of five Hellenistic deposits (Groups A–E) spread over the years from the early 3rd to the late 2nd century (as we would now date them). From this data he extracted a new date for the inception of moldmade bowls at Athens. He observed that these bowls had not been found in association with red-figure pottery in any of the many wells and cisterns explored in the first years of excavation, a fact that argued strongly for an initial date after the end of the 4th century. He also noted that there were no moldmade bowls in his Group B, the deposition of which he placed, largely on the basis of numismatic evidence, in "the first half of that [the 3rd] century, perhaps about half way along."[3] Taking this date, then, as a necessary terminus post quem for the moldmade bowl, he located its inception "in the first quarter of the 3rd century, probably towards its end."[4]

A lower date, around the middle of the 3rd century, was suggested by Roger Edwards in his 1956 publication of the bowls from the Pnyx.[5] He did not make his reason for this revision explicit, but general references to deposits at the Agora suggest that they formed the basis for his chronology. Later, in 1975, he reiterated the mid-3rd-century date, though with less certainty, speculating that it might be "late by perhaps a quarter century or so."[6]

In the meantime, Virginia Grace had been developing a chronology for the stamps that appear on the handles of Rhodian transport amphoras. She had published the single Rhodian jar from Group B in 1934,[7] but she did not comment in print upon its date until 1963. In an article focused primarily on the amphoras from excavations at Koroni, on the east coast of Attica, she presented the Group B jar as paradigmatic of Rhodian amphoras at about the time when months began to be named on the stamps (the

2. Courby 1922, pp. 360–361. He cites the following evidence: (1) bowls from Delphian tombs said to date to the end of the 4th century (*FdD* V.1, pp. 174–176; their contents include fusiform unguentaria, indicating instead a Hellenistic date); (2) the supposed contemporaneity of moldmade production with West Slope ware, which Courby dated in the late 4th to early 3rd century by comparison with a metal vase found in an Olbian tomb together with a coin of Lysamachos dated 306–281 (Watzinger 1901, p. 94); and (3) comparison of an Athena figure of the moldmade repertoire with the Athena on late Panathenaic amphoras, the production of which was then thought to have ceased at the end of the 4th century.

3. Thompson 1934, p. 332. Most of the 25 coins from the cistern system either disintegrated in cleaning or were illegible. Five now remain: ΣΤ′-728 and ΣΤ′-729, tentatively identified at the time of finding as belonging to the double-bodied owl variety (Svoronos 1923–1926, pl. 22:35–46 = *Agora* XXVI, pp. 41–42, varieties 41–43, dated 330s–322/317), but now considered illegible; ΣΤ-303, Greek but not further identifiable; ΣΤ 304, owl in wheat wreath (*Agora* XXVI, p. 45, variety 53), 284–270s, heavily worn; ΣΤ-305, uncertain wreathed piglet type (*Agora* XXVI, pp. 43–46, variety 48, 49, 51, or 55), ca. 322/317–270s, worn. For the current identification of these coins, and discussion, see Kroll 1974, pp. 202–203; *Agora* XXVI, p. 309, under H 16:3.

4. Thompson 1934, p. 457.

5. Edwards 1956, p. 90.

6. *Corinth* VII.3, p. 152.

7. Grace 1934, p. 202, no. 5, fig. 1 (jar); p. 235, no. 77 (stamp).

beginning of Rhodian period IIa), and she applied Thompson's terminal date of ca. 275 for Group B to this jar.[8]

The excavations at Koroni had shown, however, that something was amiss in the chronology devised by Thompson. The excavations, aimed at the identification of architectural traces that had long been visible on the surface, occupied a mere three weeks in July of 1960, but they bore fruit out of proportion to their modest scale and ambition. The numismatic evidence allowed the excavators to date the site within the reign of Ptolemy II and furthermore to associate it with the presence of Ptolemaic troops during the Chremonidean War, ca. 267–262/1.[9] A problem emerged, however, in the analysis of the pottery: given the terminal date in the 260s, the ceramics ought to have resembled the material in Thompson's Group B, deposited in ca. 275; instead, they corresponded more closely to material in Thompson's Group A, for which a terminal date at the turn of the 4th to the 3rd century had been proposed. This was the first hint that Thompson's pottery dates, and consequently Grace's amphora dates (which were in large part based on Thompson's dates in this period), were considerably too high.

In her initial response to the publication of the Koroni excavations, Grace argued against a downward chronological shift,[10] but she subsequently developed an independent argument for a lower chronology.[11] Her method was characteristically clearheaded and logical. She took as a given that the terms of Rhodian eponyms were annual and that all Rhodian eponyms of the 3rd and early 2nd century were known. She then counted back, allocating one year to each name, from 175, the date she assigned to the closing of the Pergamon Deposit, a large and rich assemblage of stamped amphora handles excavated at Pergamon in 1886.[12] In doing so, she arrived at a date of ca. 240 for the point when months began to be named on amphoras, and hence for the amphora in Group B. The new chronology gave a date in the late 270s for the amphoras at Koroni, somewhat earlier than the documented occupation, but not so much earlier that the amphoras might not have been serving a secondary use as water containers at the encampment.

The application of these revisions to the chronology of the moldmade bowl necessitated a lowered date for its introduction. The absence of the type from Group B provided a terminus post quem of ca. 240 for its inception. Small numbers of fragments had been found in deposits in which the latest Rhodian amphoras were only slightly later, but the first substantial aggregation of moldmade bowls was in the upper fill of the Altar Well (B 20:7), which contained fragments of over 20 bowls, along with a Rhodian amphora handle stamped in the term of Xenostratos (ca. 217 according to Grace's new chronology). This evidence suggested that moldmade bowls began to be made in Athens sometime between ca. 240 and 220. Within that span, as I argued in *Agora* XXII, 224/3 seemed a likely date; this was the year of the first celebration of the Ptolemaia, a festival initiated by the Athenians in honor of their benefactor, Ptolemy III Euergetes, and an occasion when Alexandrian silver bowls might have been on display and thus have provided models for an enterprising and inventive potter to copy in clay.[13]

8. Grace 1963, pp. 324–325, 333–334, no. 7, fig. 1.

9. Vanderpool, McCredie, and Steinberg 1962, pp. 56–60. For a recent summary of the evidence for the dating of the war, see Badoud 2003, p. 584.

10. Grace 1963, pp. 329–332.

11. Grace 1974.

12. Schuchhardt 1895; Börker 1998; Lawall 2002.

13. *Agora* XXII, pp. 9–13. The date of the introduction of the festival has now been more firmly established (Habicht 1982, pp. 106–109).

THE MOLDMADE BOWL AND NEW REVISIONS TO THE AMPHORA CHRONOLOGY

Many scholars have been inclined to accept the conclusions summarized above, but others have had reservations, believing that 224/3 is too precise or too late a date for the earliest bowls.[14] Now, however, Gérald Finkielsztejn has proposed yet another revision of the Rhodian amphora chronology,[15] which, if correct, shows that moldmade bowls were introduced at least that late, if not later. Finkielsztejn's method is not unlike Grace's. He makes the same assumptions—that the eponyms served a one-year term and that all Rhodian eponyms are probably known—and he too counts back from a fixed point. He discards the Pergamon Deposit as a datum point, however, anchoring his sequence instead to historically known destruction dates of various cities (mostly in the Levant). He also points out what is clearly a worrying fact: that the period from the end of the Pergamon Deposit (175, according to Grace) to the destruction of Corinth (146)—period IV in the Rhodian chronology—covers a span of 29 years, but contains only 14 known eponyms.[16] Counting back from the destruction of Corinth in 146, he arrives at a date of ca. 160 for the beginning of period IV, some 15 years later than Grace's estimate.

This downward shift of course has an impact on earlier periods as well. Grace assigned period III to the years ca. 205–175, while Finkielsztejn dates it between 198 and 161, and period II is shifted from 239–206 to 234–199.[17] Finkielsztejn's arguments are persuasive, and, so far, have stood up well to expert scrutiny.[18] Furthermore, Christian Habicht has reviewed the Rhodian epigraphical evidence for the men who stamped as eponyms and found it to be largely consistent with the new chronology, although his work reveals the necessity for some minor adjustments to Finkielsztejn's dates.[19] My aim here, however, it not to discuss the details of the new chronology, but rather to investigate the implications of this downward shift for the date of the introduction of the moldmade bowl at Athens.

Finkielsztejn's chronology places the Rhodian amphora in Group B, which has always served as the terminus post quem for moldmade bowls, in the span 233–220. The handle gives only a fabricant, but Grace long ago suggested restoring the eponym as Philokrates.[20] If this conjecture is correct, the date would be around the middle of period IIa (perhaps ca. 226) in Finkielsztejn's scheme,[21] and Group B (thought to be without moldmade bowls) must have been discarded after that date. Xenostratos, the latest eponym in the Altar Well (with many fragments of moldmade bowls), falls either late in period IIb or early in period IIc; Finkielsztejn places him in ca. 211, or perhaps later. Finkielsztejn's revisions, then, suggest that the introduction of the moldmade bowl should be bracketed between ca. 226

14. E.g., Özyiğit 1990, p. 96; Massa 1992, p. 33; Hausmann 1996, p. 105.

15. Finkielsztejn 2001.

16. Finkielsztejn 2001, pp. 127–129.

17. For a summary of the changes, see Finkielsztejn 2001, pp. 196–197, tables 22.1 and 22.2.

18. Lund 2002; Lawall 2003; Badoud 2003.

19. Habicht 2003.

20. Grace 1963, p. 326, n. 16.

21. Finkielsztejn assigns most of the eponyms of period II to subperiods and, within these, to smaller stylistic groups. The position of any one eponym within the stylistic group, however, is conjectural and Finkielsztejn refrains from assigning annual dates to most eponyms in this period. His estimate of the date, however, can be extrapolated from one of his tables (Finkielsztejn 2001, p. 191, table 18).

Figure 1 *(above)*. **Fragment of a moldmade bowl from Thompson's Group B (P 34577).** Scale 1:1

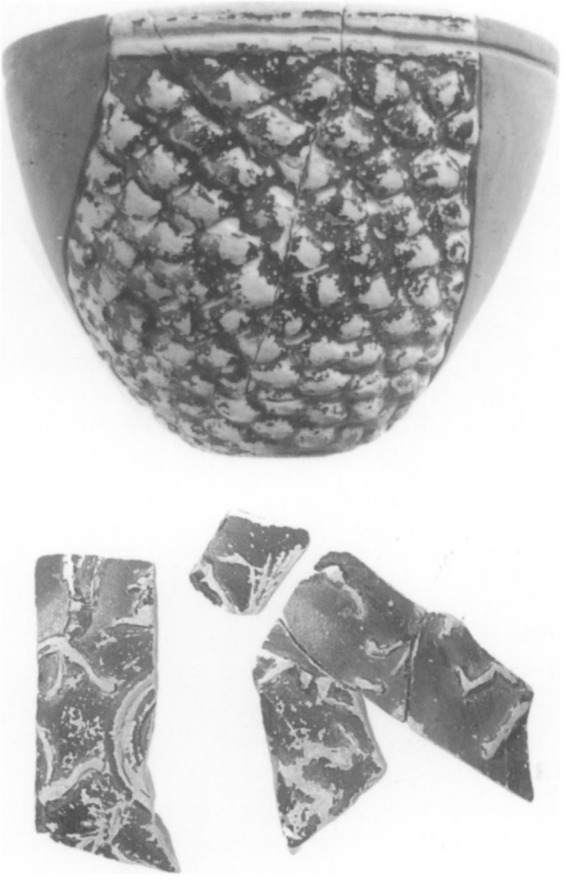

Figure 2 *(right)*. **Moldmade bowls from cistern P 10:2 (P 19705, P 19720).** Scale 2:3

and 211, making an initial date of 224/3, while not impossible, seem less likely than it once did.

A new and surprising discovery, however, now comes into play. Despite Thompson's assertion to the contrary, Group B does contain a moldmade bowl: a small fragment (max. p. dim. 3 cm) that can be attributed to the Workshop of Bion (Fig. 1).[22] It is hard to explain how Thompson missed it; possibly he considered it an intrusion and thus not worthy of mention.[23] It comes from lot ΣΤ′ 105, a small amount (one bag) of pottery from the drawshaft and the passage that connected it with the northern chamber of the cistern system.[24] Such a small fragment could, of course, have found its way into the deposit in a number of ways, but let us assume for the moment that it is part of the original deposit. Such a supposition receives support from the contents of another cistern (P 10:2), which include considerably larger fragments of two moldmade bowls (Fig. 2)[25] and, as the latest datable object, a Rhodian amphora handle naming the eponym Philokrates—the same eponym conjecturally restored on the Group B amphora.

22. P 34577. For the Workshop of Bion, see *Agora* XXII, pp. 26–27. For the rim pattern of the fragment, cf. *Agora* XXII, pp. 49, 55–56, nos. 43, 99, 103, pls. 7, 17, 18, 75, 98.

23. While some later Hellenistic material has been identified in the deposit, it comes from elsewhere in the system: a fragment of a 2nd-century plate from the northern chamber; two fragments of a type 27 D lamp (L 5215) from the south chamber.

24. See plan in Thompson 1934, p. 331, fig. 12.

25. P 19705 (*Agora* XXII, p. 45, no. 3, pls. 1, 92), about a quarter of a pinecone bowl; and P 19720 (cf. *Agora* XXII, pp. 75–76, no. 252, pl. 50), five fragments preserving a small part of the lower wall of a figured bowl with a hunting scene, probably to be attributed to Workshop A. For Workshop A, see *Agora* XXII, pp. 28–29.

Figure 3. Moldmade bowls from cistern N 21:9 (P 34499, P 34498, P 34967, P 34968). Scale 2:3

No moldmade bowls were found in the substantial upper fill of well B 13:8, which contains amphora handles stamped with the names of the eponyms Xenaretos and Kallikratidas I, probably dating slightly after Philokrates. Fragments of four bowls, however, occur in cistern N 21:9 (Fig. 3),[26] which also yielded the handle and neck of an amphora manufactured by the fabricant Pausanias II, whose activity can be placed largely within period IIa on the basis of the eponyms with which he is associated (ca. 234–218); and two small rim fragments came to light in cistern L 17:7,[27] along with an amphora handle naming the eponym Aglokritos (period IIb, perhaps ca. 216). In view of these findings, the single fragment in Group B seems unexceptional, and we may cautiously view it as

26. P 34498, P 34499 (fragments preserving the medallion and lower wall of one floral bowl and about a third of another floral bowl), and P 34967, P 34968 (three small fragments of two figured bowls).

27. Lot Φ 184. The only trace of decoration that remains is part of the rim pattern on one fragment: the tip of a palmette and the tail of a dolphin that flanked it.

part of the original deposit. Assuming that the fragments of amphoras and moldmade bowls in these contexts are approximately contemporary,[28] a date of 224/3 for the introduction of the moldmade bowl at Athens thus remains a possibility, even in light of the downwardly shifted amphora chronology.

MOLDMADE BOWLS IN THE ATHENIAN STRATIGRAPHIC RECORD

A precise date for the introduction of the moldmade bowl will probably always elude us. What is perhaps more important is to track the introduction of the new type with an eye to how it is represented in deposits of (approximately) known date. Such a process reveals that, although the moldmade bowl may loom large in modern archaeological eyes as an important dating tool, it loomed rather small in ancient debris (and perhaps in daily life) in the first generation or so of its production.

With one exception, discussed below, wells and cisterns dated by Rhodian amphoras of period II and the earlier part of period III (IIIa–b, ending ca. 182) contain very small numbers of moldmade bowls, usually fragments representing between one and six vessels (see Tables 1 and 2); the average of bowls per deposit for the period is about four. There are even some deposits with amphoras dating well on in period II or early in period III that contain no bowls at all. Two nearly complete jars of the eponym Aristonidas at the bottom of well B 13:7 show that it was filled no earlier than 208/7—the date of Aristonidas as established on the basis of epigraphical evidence[29]—but no moldmade fragments exist among the 57 identified fine-ware pieces in the deposit. Likewise, the nearby drawshaft B 13:3, with ca. 25 identified fine-ware vessels, contained no moldmade bowls, although it was deposited no earlier than the first years of the 2nd century (the date is given by the eponym Dorkulidas). Given the considerable number of deposits with contemporary handles in which moldmade bowls are present, it seems likely that their absence here is a matter of chance, probably reflecting the nature of the source of the material, rather than an indication that production began so late.

28. This seems the safest assumption, in the absence of any reliable basis upon which to formulate a general rule about the relative ages of transport amphoras and the household pottery found with them. Ethnographic studies of the use life of pottery suggest that different shapes enjoy different longevity, and, in general, large shapes last longer than small ones (Foster 1960; Longacre 1985; Rice 1987, pp. 296–299). Given these findings, one might therefore expect that amphoras would be older than the drinking cups with which they were found. The large vessels considered in these studies, however, were mostly water jars and storage vessels. Transport amphoras have a different function, serving as shipping containers, and may be expected to follow a different pattern of breakage. They might be discarded immediately upon being emptied of their contents and thus have a short use life; or they might be retained for secondary use, in which case they would enjoy the longevity of the water and storage vessels in the ethnographic data. In reviewing pottery from the Palatine in Rome, Peña (1998) found that similar percentages of amphoras and tablewares could be dated to the same phase (12.8% and 13.5%, respectively), and that a slightly larger percentage of tablewares was residual (15.1% versus 12% for amphoras). This finding suggests that amphoras need not, as a general rule, be considered older than the tableware with which they are associated in archaeological deposits.

29. Habicht 2003, p. 546.

TABLE 1. AGORA DEPOSITS FOR WHICH A PERIOD II RHODIAN AMPHORA PROVIDES TERMINAL DATE*

Deposit	*Moldmade Bowls*	*Latest Rhodian Amphora*	*Handles/ Rhodian*	*Rhodian Period*[a]	*Grace Date*[b]	*Finkielsztejn Date*[c]
Wells and Cisterns						
H 16:3 (Group B)	1 small fr (P 34577, Workshop of Bion)	Zenon I fab/[Philokrates?] ep nearly complete (SS 370)	2/1	IIa	ca. 240	ca. 233–220 [ca. 226]
P 10:2	frr of 2 bowls (P 19705, P 19720, 1 of Workshop A)	Philokrates ep (SS 7771)	2/2	IIa	ca. 240	ca. 233–220 [ca. 226]
B 13:8, upper fill	none (at least 65 fine pots represented, largely Classical to early 3rd century)	Kallikratidas I ep (SS 7764, with another handle from same jar)	8/8	IIa	ca. 250–225	ca. 233–220 [ca. 224]
		Xenaretos ep (SS 7269, with another handle from same jar)		IIa		[ca. 223]
N 21:9	frr of 4 bowls (P 34498, P 34499, P 34967, P 34968)	Pausanias II fab[d] (SS 10015, neck + handle)	1/1	IIa	ca. 250–225	ca. 234–218
L 17:7	2 small rim frr (Workshop A) in sizable deposit (lot Φ 184)	Aglokritos ep (SS 14279, with another handle perhaps from same jar)	7/4	IIb	after ca. 240	ca. 219–210 [ca. 216]
B 20:7 (Altar Well), upper fill	at least 22 bowls (P 17511–P 17514, P 17622, P 34506, lot NN 377)	Xenostratos ep (SS 9663)	6/3	IIb or c	ca. 217	[ca. 211 or later]
		Xenophantos ep (SS 9660)		IIb	before 225	ca. 210
H 6:4 POU fill	6: 1 nearly whole (Workshop of Bion) + frr of at least 5 (P 401, 4879, lot A 216).	Xenostratos ep (SS 148)	8/2	IIb or c	ca. 217	[ca. 211 or later]
N 21:4 (Satyr Cistern), lower fill	2: 1 ca. half preserved (P 16221, metal cast) + 1 fr (lot EE 18, Workshop of Bion)	Xenostratos ep (SS 8934, neck + 2 handles)	9/8	IIb or c	ca. 217	[ca. 211 or later]
B 13:7, bottom fill	none (at least 57 fine pots represented)	Three nearly complete jars of	5/4			ca. 209–205
		Mution ep (SS 7582) and		IIc	ca. 224	[ca. 208]
		Aristonidas ep (SS 7581, SS 7583)		IIc	ca. 222	208/207[e]
L 19:2, lower fill	5 frr of 1 bowl, slightly worn; small amount of fine ware (lot ΔΔ 16)	Theuphanes II ep (SS 9579)	3/3	IIc	ca. 213[f]	ca. 204–199 [ca. 203]
L–M 19:1	frr of at least 7 bowls, small amount of fine ware (P 17085, lot X 164)	Pausanias II ep (SS 9662)	3/3	IIc	shortly before ca. 206	ca. 204–199 [ca. 199]
Fill						
N 10:2	none (only 3 frr of fine pottery in deposit)	Sochares ep (SS 3784+3811)	29/24	IIb	after ca. 240	ca. 219–210 [ca. 218]
Total	minimum of 47 bowls in 12 deposits		83/63			

* Deposits with period II Rhodian amphoras as the latest datable objects but not included in the table: A 18:1 (contains a substantial 2nd-century intrusion); E 14:1 (contains a substantial later intrusion); O 20:3, level IV (superimposed over O 20:3, level III, with a period III handle; see Table 2).

[a] According to Finkielsztejn 2001, p. 191, table 18, with adjustments based on Habicht 2003.

[b] From Grace and Savvatianou-Pétropoulakou 1970; Grace 1974; *Agora* XXIX, summarized in Finkielsztejn 2001, p. 191, table 18.

[c] Dates in brackets give the position of the eponym in Finkielsztejn's table 18; spans are his dates for the period in question.

[d] For eponyms associated with Pausanias, see Jöhrens 1999, p. 17; Finkielsztejn 2001, p. 76, n. 55.

[e] According to Habicht 2003, p. 546.

[f] V. R. Grace (pers. comm.).

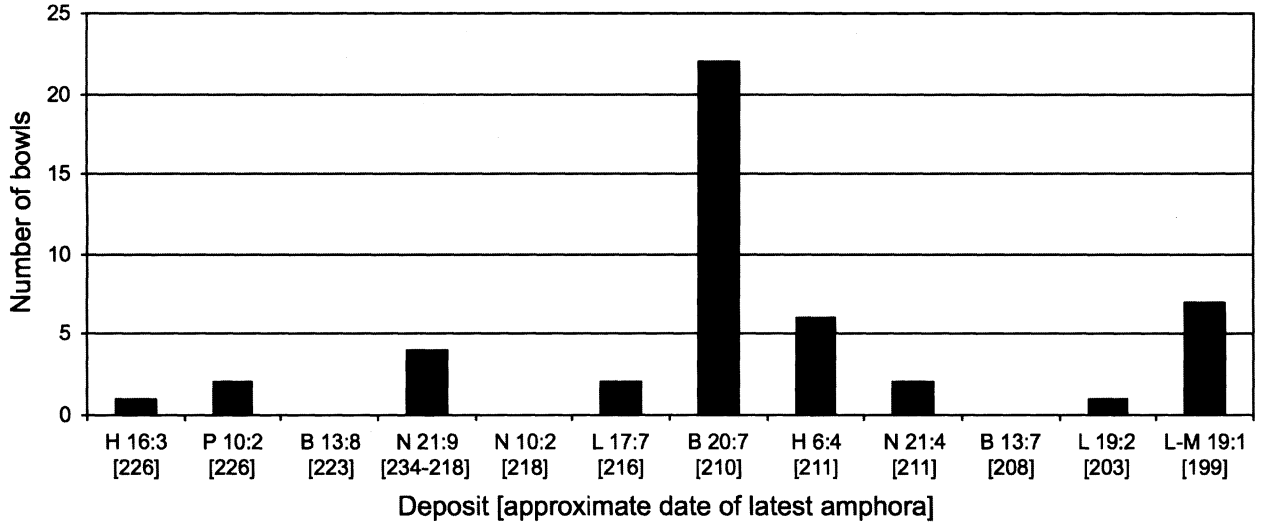

Figure 4. Number of moldmade bowls in deposits for which an amphora of Rhodian period II gives the terminal date

The only deposit in period II with a substantial representation of moldmade bowls is the upper fill of the Altar Well (B 20:7). Its terminus post quem is supplied by handles stamped by Xenophantos I (ca. 210) and Xenostratos (late period IIb or period IIc, ca. 211 or later). As noted above, the fill contained many moldmade fragments, representing at least 22 bowls, badly shattered and battered; a glance at Figure 4, a graphic representation of the numbers in Table 1, makes the anomaly of these statistics glaringly clear. The well is located in the industrial district southwest of the Agora square, and the fill included many fragments of terracotta figurines and one mold (T 2277), as well as a possible kiln support (P 17515).[30] A workshop may be the source of at least some of this material, a possibility that would help to explain the high concentration of moldmade bowls (although fragments from two different workshops—Workshop A and the Workshop of Bion—are present).

Another, and in my view more likely, explanation is that the fill entered the well considerably later than the date of the latest amphora handle. While this is always a possibility, some tangible support for it in this case comes from the fact that joining pieces of the same pot[31] have been found in the Altar Well and in the lower fill of cistern B 18:13, some 36 m to the north, which contained an amphora handle dated to the span ca. 198–187 by the Rhodian fabricant Aristion. There are also fragments of what appears to be the same moldmade bowl in these two deposits (five fragments from B 18:13 and nine from the Altar Well).[32] If the source of those two fills was the same, the Altar Well may also have been filled in the early 2nd century; and in that case the larger number of moldmade bowls is easily understood.

Moldmade bowls continue to be sparsely represented in cisterns containing Rhodian handles dating in the earlier part of period III (IIIa and b, ca. 198–182); four bowls per deposit remain the average (Table 2). The larger sample provided by fills of this period suggests that the industry was well established, but the nature of these deposits, extensive and subject to disturbance, makes their evidence difficult to evaluate. Some contain later

30. For the terracottas, see Thompson 1959. For the kiln support, see Papadopoulos 1992, pp. 209, 211, fig. 4, pl. 51:a.

31. P 17517+P 21112 (*Agora* XXIX, p. 360, no. 1214, fig. 75, pl. 90).

32. Stored in lots NN 377, 399, 401. Although there is no join between the two groups of fragments, several details suggest that they come from the same bowl. The shape of the rim, the rim pattern, and the distance of the rim pattern below the lip are the same in both groups. Moreover, both sets of sherds have a fugitive gloss verging from black into a dull purplish red on the rim; display similar patterns of cracking in the gloss; and share an identical fabric color.

TABLE 2. AGORA DEPOSITS FOR WHICH A PERIOD III RHODIAN AMPHORA PROVIDES TERMINAL DATE

Deposit	*Moldmade Bowls and Molds*	*Latest Rhodian Amphora*	*Handles/ Rhodian*	*Rhodian Period*[a]	*Grace Date*[b]	*Finkielsztejn Date*
Wells and Cisterns						
B 13:3	none among ca. 25 identified fine-ware pots	Dorkulidas ep (SS 6428)	2/2	IIIa	ca. 210	close to 198[c]
O 20:1, lower fill	3 frr of 3 bowls (lot Ω 36) in tiny deposit	Agloumbrotos ep (SS 8074)	1/1	IIIa	ca. 211	ca. 197
B 18:7, upper fill	6 frr of at least 3 bowls (P 20539–P 20541, lot NN 787)	Sostratos ep (SS 10145)	2/2	IIIa	ca. 225–200	ca. 194
B 13:1, lower fill	1 fr among ca. 44 identified fine-ware pots (lot ΠΘ 336)	Damokrates I fab (SS 6523)[d]	3/2	IIc–IIId	ca. 205–185	ca. 199–172/170
B 18:13, lower fill	22 frr of at least 8 bowls (lots NN 399, 401)	Aristion fab (SS 9901)	5/5	IIIa–b	ca. 210–199	ca. 198–187
O 20:3, fills III and IV	5 frr of 5 bowls (P 14166, P 20581, lots Ω 21, 23)	Aristokrates II fab (SS 8133)	4/2	IIIa–b	ca. 208–196	ca. 196–183
K 18:2	4 frr of 3 bowls (P 9399, lot Y 3)	Kratidas ep (SS 7085)	13/10	IIIb	ca. 199	ca. 187
O 20:2	13 frr of at least 6 bowls (P 14186, lot Ω 29)	Hieron I ep (SS 8020)	13/8	IIIb	ca. 198	ca. 186
B 20:2	at least 11 bowls, 1 mold (P 17027–17030, lot NN 268)	Kleukrates ep (SS 9383)	17/7	IIId	ca. 188–186	ca. 174–172
M 18:10	at least 50 bowls, 1 mold	Athanodotos ep (SS 14296)	14/5	IIId	ca. 183	ca. 170–168
N 20:7	at least 49 bowls	Xenophon ep (SS 7898)	9/4	IIIe	ca. 175	ca. 164–162
Q 12:1	none, almost no fine ware	Amuntas fab (SS 11122)	2/1	IIIc–IVa	ca. 185–175	ca. 179–155
Fills						
T–U 21:1	310 frr of at least 68 bowls, including one early long-petal fr (P 34485, lots EΛ 168–170)	Agloumbrotos ep (SS 15053) Damokrates I fab (SS 15046)	14/11	IIIa IIc–IIId	ca. 211 ca. 210–185	ca. 197 ca. 199–172/170
K 7:1	5 frr of 5 bowls (P 34500, lot H 62)	Agloumbrotos ep (SS 4494) Aristion fab (SS 4511) Damokrates I fab (SS 4475)	37/28	IIIa IIIa–b IIc–IIId	ca. 211 ca. 210–199 ca. 205–185	ca. 197 ca. 198–187 ca. 199–172/170
T 21:1	at least 23, with 3 frr of developed long-petal bowls (P 34093, P 34487 from lots EΛ 149–154, 178); evidence of disturbance (a globule lamp)	Sodamos ep (SS 15018)	24/16	IIIa	ca. 207	ca. 195
Q 8–9 (fill of Square Peristyle)	At least 190 bowls, including M Monogram class and early long-petal fragments (P 20204, P 31696, P 31740)	Hieron I ep (SS 10831)	122/57	IIIb	ca. 198	ca. 186
H–K 12–14 (Middle Stoa building fill)	40 inventoried frr, 6 molds (no complete tally of uninventoried fragments has been made), including M Monogram class and early long-petal frr (P 21048, P 21049, P 22858, P 24819, P 31698, P 31699, P 31701)	Athanodotos ep[e]	1498/885	IIId	ca. 183	ca. 170–168
Total	minimum of 473 bowls and molds in 17 deposits		1780/1046			

[a] According to Finkielsztejn 2001, p. 192, table 19.
[b] From Grace 1985; *Agora* XXII; *Agora* XXIX, summarized in Finkielsztejn 2001, p. 192, table 19.
[c] Finkielsztejn placed Dorkulidas in ca. 198, but Habicht (2003, p. 557) has established that Theuphanes II held office that year. According to Finkielsztejn (pers. comm.), Dorkulidas should be shifted to "another (very close) slot."
[d] For the eponyms linked with Damokrates, see Jöhrens 1999, p. 40.
[e] For detailed analysis of the amphora handles in the Middle Stoa building fill, see Grace 1985.

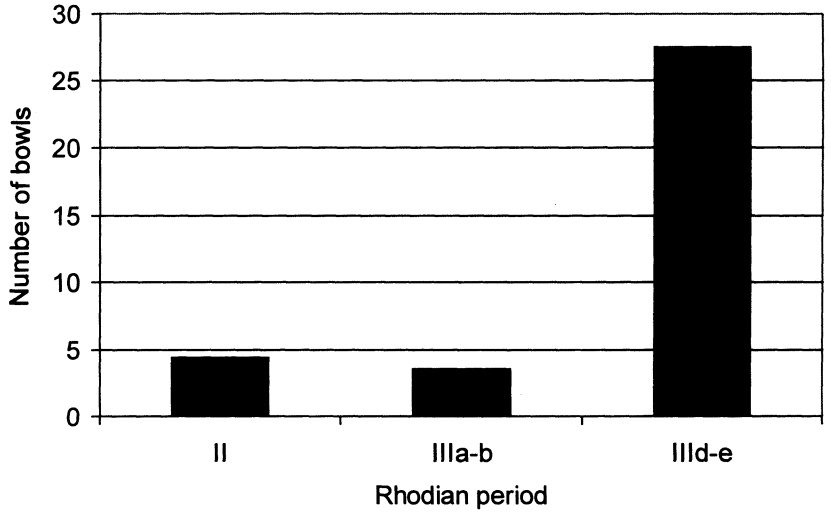

Figure 5. Average number of moldmade bowls per well or cistern in deposits dated by Rhodian amphoras of periods II and III

types (early long-petal bowls in T–U 21:1 and Q 8–9; fragments of the M Monogram class in Q 8–9), but whether these are intrusions, evidence that those types appear earlier than was thought, or a hint that the deposits are significantly later than the latest amphora handle is impossible to know.

Large numbers of moldmade bowls are the clear earmarks of well and cistern deposits dated by amphoras of Rhodian period IIId (which, according to Finkielsztejn, begins ca. 175). Here the average is 27.5 per deposit, an enormous increase over what had gone before and confirmation that, by that time, the moldmade bowl was in wide use in Athens (Table 2, Fig. 5).

TRACKING AN INNOVATION

While clarifying the approximate date of the introduction of the moldmade bowl, the account above leaves a number of puzzles unsolved. The origin of the models and the mechanism that brought them to Athens remain uncertain. Nor do we know how nonelite Athenians became sufficiently aware of those costly models to desire inexpensive copies, or how potters acquired examples of them for copying. The sparse representation of the new invention in archaeological contexts deposited in the first 40 years of production also requires explanation. A closer look at the details of the innovative process, and some help from innovation theory, may throw light on these issues.

Using insights derived from the study of more recent technological advances, D. A. Spratt has developed models that can be used to track the innovative process.[33] Although the analogy between innovation in industrial societies and in earlier and simpler societies (and economies) is not exact, the models can help to clarify some aspects of the ancient process. Spratt writes chiefly of more momentous inventions—agriculture, bronze metallurgy, the coke-fired blast furnace—but his models should be applicable to lesser innovations as well, and it is illuminating to apply them to the development of the moldmade bowl.

33. Spratt 1982, 1989.

Spratt breaks the innovation process into six parts: (A) discovery, (B) invention, (C) development, (D) investment, (E) production and distribution, and (F) obsolescence. These stages may be sequential, or some may occur at the same time, and the duration of each phase may differ from case to case, but all innovations pass through all of these stages, and we can classify the events in the development of the moldmade bowl accordingly.

Discovery, defined by Spratt as "an addition to the body of technical or scientific knowledge,"[34] may occur simultaneously with invention, or it may have taken place long before. The latter is the case with the moldmade bowl. The technical process of creating a clay vessel in a mold was at least as old as the Aegean Bronze Age. It was familiar to Athenian potters of the Archaic and Classical periods,[35] and had been newly applied to the manufacture of lamps in the third quarter of the 3rd century.[36] Athenian potters had also, since the 5th century, regularly created the round bottoms of shallow cooking pots by pressing clay into a convex bat (in essence a shallow mold) and then throwing the upper part of the vessel on the wheel.[37] As well, Athenian artisans were skilled at taking impressions from a wide variety of metal objects and casts of metal objects.[38] Although adjustments would be needed before this technology could be applied to the production of moldmade bowls, the basic concepts and practices were firmly in place long before the second half of the 3rd century.

Spratt defines the second step, invention, as a mental process: "the perception of the practical use of technical knowledge."[39] In our case, this constitutes a potter's insight that the mold process could be adapted to the manufacture of a hemispherical bowl with relief decoration on the exterior. Here, however, we must turn to another of Spratt's points: that other developments, such as social, economic, or military changes, have as much of an impact as purely technological ones on innovation and on the success and acceptance of the resultant product. In the case under consideration, it was the presence of new models and an incentive to copy them—factors that lie within the realm of historical, political, economic, and social development—that led to the invention.

Let us examine this step of the process in more detail. First, the models. Their appearance is preserved for us in moldmade bowls made in molds taken directly from metal bowls, or from casts of metal bowls (Figs. 6–8).[40] The motifs and their arrangement—alternating leaves, petals, and floral tendrils springing from a medallion—were by the later 3rd century a staple of the Hellenistic artistic koine, and it is not possible to know where the metal models were produced. Although many, including myself, have argued

34. Spratt 1982, p. 80; 1989, p. 246.

35. E.g., for rhyta in the 5th and 4th centuries (Hoffmann 1962; Kopcke 1964, p. 56, nos. 334–336, Beilage 8) and plastic lekythoi in the 4th (Trumpf-Lyrizaki 1969; Williams 1978).

36. *Agora* IV, pp. 129–131, types 42 A and 42 B; see *Agora* XXIX, p. 505, for revised dates.

37. *Agora* XII, p. 35; *Agora* XXXIII, forthcoming. It has also been argued that this process was used for the production of many earlier glass vessels, in particular for Achaemenid glass bowls of the 5th and 4th centuries (Lierke 1993). I thank Marianne Stern for bringing this information to my attention; she adds that Rhodian and Macedonian glass bowls of the second half of the 4th century appear to have been made in this way (Triantaphyllides 2000). It is possible that Athenian potters might have had access to this information.

38. Thompson 1939; Reeder 1976.

39. Spratt 1982, p. 80; Spratt 1989, p. 246.

40. Rotroff 1982.

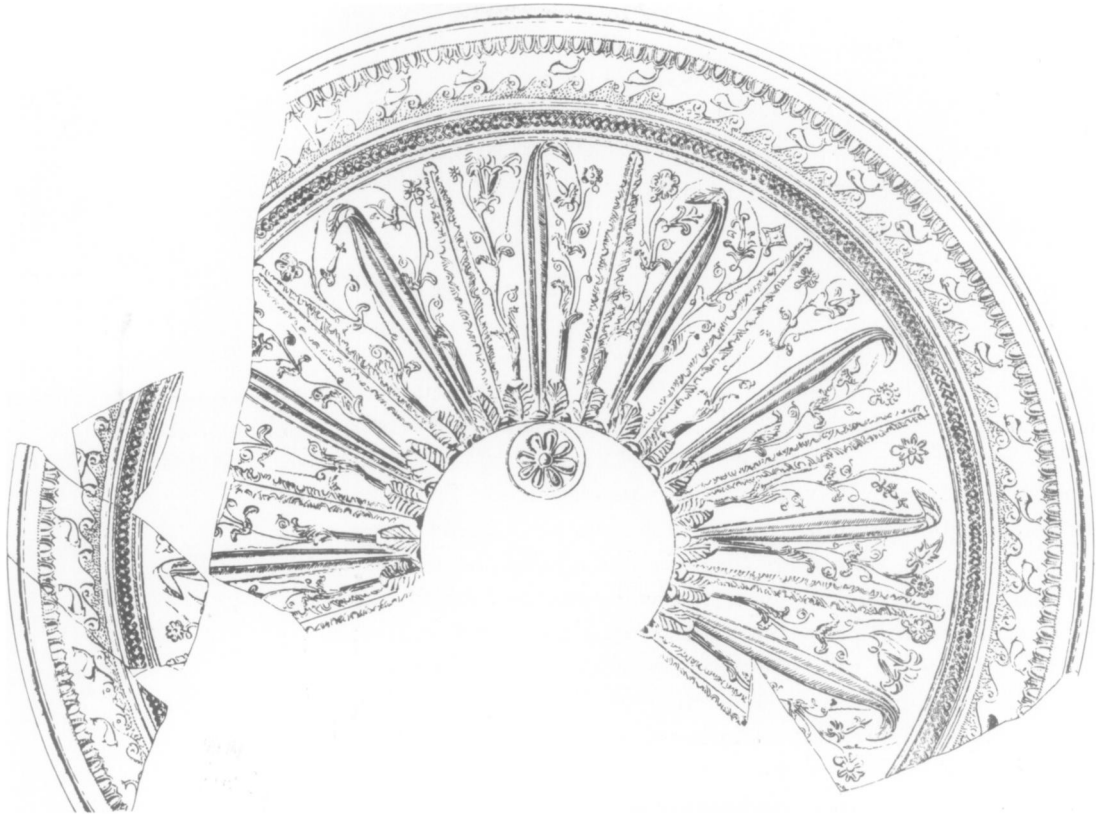

Figure 6. Bowl made in a mold taken directly from metalware (P 5813). Scale 2:3. Drawing P. de Jong

Figure 7. Bowl made in a broken mold (P 16221). Scale 2:3

for Alexandria as a source,[41] other centers of production, such as Sicily or southern Italy, or even Athens itself, might lay claim to the honor.[42] This makes the potter's motive for replicating the metal bowls in clay at this particular moment more difficult to fathom.

41. Zahn 1904, pp. 412–415; Thompson 1934, p. 455; Byvanck-Quarles van Ufford 1953, pp. 13–15; Parlasca 1955; Hausmann 1959, pp. 19–22; *Agora* XXII, pp. 6–9.

42. Nenna and Seif el-Din (2000, pp. 135–136) express reservations about an Alexandrian model, noting that the form of the earliest Athenian bowls (hemispherical with an outturned rim) is relatively rare in the large corpus of Egyptian Hellenistic faience bowls (types T2.1 and T2.2, pp. 185–194, pls. 30–33). It is also noteworthy that their catalogue of faience vessels preserves no close parallels for the decorative scheme of the earliest Athenian bowls. Conversely, that scheme—alternating lotus petal and acanthus leaf separated by floral tendrils—appears on a 3rd-century silver bowl of Sicilian provenance and probably of Sicilian or South Italian manufacture (Bothmer 1984–1985, pp. 54–55, no. 92) and on the pyxis in the Treasure of Taranto (Pfrommer 1987, pl. 33).

Figure 8. Bowls with three different rim patterns: dolphin, floral, inverted ovolo (P 11436, P 27436, P 34969). Scale 1:1

The relationship between metal and ceramic vessels has received considerable attention in recent decades. Michael Vickers and David Gill have argued that a large majority of fine wares are close replicas of metal originals.[43] Although their work has concentrated on the figured pottery of the Archaic and Classical periods, they have also applied the principle to the ceramics of other times and places, including the moldmade bowls of the Hellenistic period.[44] They take it as axiomatic that such imitations should be the norm, and that there would always be a demand for down-market versions of precious vessels. While this may be so, it fails to explain why certain forms were imitated in preference to others, and why they were imitated at one time rather than another.

Margaret Miller has explored the forces behind such imitations in her discussion of the introduction of black-gloss imitations, adaptations, and derivatives of Persian metalwork in the 5th century.[45] Although the influx of Persian booty at the end of the Persian wars made eastern metalwork more visible in Athens, Miller discounts its presence as a sufficient explanation for the ceramic phenomenon, for it does not explain why Athenians would be receptive to those models—or, more pointedly, why Athenians would want to acquire replicas of the dinnerware of their enemies. Miller finds the answer in the social and political climate of the period. She proposes that perceived similarities between Athenian and Persian elites would have made Persian vessels attractive to wealthy Athenians as "ready-made signifiers of aristocratic wealth and authority"; and that later in the 5th century, with the growth of the Athenian empire, Athens' "middle-class imperialists" constituted a market for ceramic copies of these same symbols of imperial power.[46]

The social and political situation two centuries later was different, but the question is the same: why these cups, at this time? The hypothesis that the models were Alexandrian goes some way toward providing an answer. The departure of the Macedonian garrison from the Piraeus in 229 opened the way for renewed relations with the Ptolemies, and highly placed Athenians surely cultivated those ties assiduously.[47] Alexandrian silver was the opposite of Persian booty: the luxury ware of potent political friends rather than of enemies. Public display of Alexandrian silverware—a festival such as the Athenian Ptolemaia may have provided a mechanism for such display—would have given the ordinary Athenian a view of these elite goods, which otherwise circulated only within the households of the wealthy.

43. Vickers and Gill 1994.

44. Vickers and Gill 1994, pp. 178–180; see also Vickers, Impey, and Allan 1986, pls. 26, 27.

45. Miller 1993.

46. Miller 1993, pp. 137–141.

47. For Athens' relations with the Ptolemies at this time, see Habicht 1982, pp. 105–117; 1992, pp. 74–77; 1997, pp. 179–185.

The copying of those goods, however, requires more than admiration from afar. The ceramic bowls made in molds taken directly from metal ware show that the potter had access to a set of metal cups (or to a cast of such a set). How did they come into his hands? It may be that someone with an interest in supporting close ties with the Ptolemies commissioned the potter to make copies, and furthermore supplied him with the models necessary to carry out that commission.[48] A similar situation occurred half a century earlier, when an Athenian potter produced a series of hemispherical drinking cups with the relief portrait of King Ptolemy on the floor.[49] In my imagined scenario, the first imitations of metal relief cups may have been made at the instance of Ptolemaic ambassadors or of Athenians supportive of strong links with the Ptolemaic kings, perhaps to serve as gifts or souvenirs on the occasion of the Ptolemaia. Unlike the earlier cups with portraits of the Egyptian king, however, the moldmade bowl was not a short-lived phenomenon. His commission finished, the potter found it worth his while to devise a method for the large-scale production of adaptations of the silver cups. It is here that public display may have played a role: the placement of elite tableware before the public eye could have created a demand for copies, providing an economic incentive for continued production of clay relief bowls. Although this is only a plausible narrative, it has the advantage of explaining both how a potter would have had access to imported silverware, and why there would have been a market for copies.

According to Spratt's model, invention—the idea of throwing within a mold to create hemispherical relief bowls—is followed by development and investment.[50] At the development stage, the idea is put into practice and through experiment, trial, and error, a workable process of manufacture is created. In our case, it was the open shape of the cups that presented a special challenge. Earlier Athenian moldmade vessels, such as rhyta, plastic lekythoi, and lamps, were closed shapes. They were made by spreading clay into a two-piece mold, and the appearance of the interior, which would not have been visible in the finished vessel, was unimportant. The interior of an open shape, however, is visible and must be smooth. The existing technique was inadequate here, since it would have taken too much time to smooth the inner surface by hand. The solution was to smooth the interior mechanically, on the wheel, which led to the adaptation of the existing technology to a new practice, that of throwing the bowl within the mold. This process in modern ceramic manufacture is known as jollying and is accomplished with the use of a machine that makes it possible to throw a vessel with a uniformly thick vessel wall within a mold. It is likely that ancient Athenian potters too developed some such device, or at least used a

48. It is also possible that the commission was to an Athenian silver worker, to produce metal replicas of such cups. This would add another step to the process, but it has long been realized that metalworkers and potters worked in close association (Thompson 1966, p. 55; Barr-Sharrar 1990), and it probably would not have been difficult for a potter to borrow metal vessels (or casts) from a metalsmith's workshop.

49. Rotroff 1988; *Agora* XXIX, pp. 277, 281–282, nos. 333, 376, pls. 33, 36.

50. José Saramago's novel *The Cave* (2002) presents a potent account of the difficulties encountered by a potter forced to abandon wheelmade pottery and produce moldmade figurines in considerable numbers. While fictional, it brings home the challenges involved in undertaking new working methods and in the manufacture of new products at a large scale.

handheld template, enabling them to make bowls with very uniform walls no more than 3 mm thick.[51]

Before that could happen, however, the mold had to be made. Unlike the molds for later moldmade bowls, the first molds were created as direct clay impressions from at least three metal bowls (or casts; see Figs. 6–8).[52] The impression was taken by completely encasing the decorated surface of the model in clay, probably the highly refined clay routinely used for figurine molds; to avoid cracking as the mold dried over its convex model, it must have had a very small coefficient of shrinkage. The exterior of the mold was shaped on the wheel, either in the wet or leather-hard stage, since it had to be perfectly smooth and regular if it was to be centered on the wheel and bowls were to be thrown within it.

The construction of such a mold must have been a delicate process, for it would have been difficult to remove the model from the enclosing clay mold without damaging the impressions left on the mold's inner surface. The potter could have solved this problem by slicing the mold in half, creating a two-piece mold, as was done for lamps and figurines; but the absence of a seam in the one nearly complete bowl that was made in such a mold (Fig. 6)[53] shows that this solution was not applied. These prototype molds were sufficiently prized to continue in use after breakage and mending, as a diagonal ridge on the surface of P 16221 attests (Fig. 7).

The prototypical process had some disadvantages. It required a costly patrix (a metal bowl or a cast of such a bowl) and an exacting procedure of mold creation. While adequate for completing a one-time commission, it would have been difficult to adapt to a larger scale of production. Furthermore, it afforded no possibility of innovation in the decoration of the resultant bowls. In any event, a different technique soon replaced it. In this process, a plain wheelmade bowl served as a mold blank, and its inner surfaces were decorated with a combination of wheel-run, hand-drawn, and stamped decoration. Its development would have required some time, for the many stamps used to decorate the wall would have had to be designed, created, and tested and a sufficient number of molds made to support production. This would constitute the investment stage of the process, as time and work were diverted to this project from other tasks in the pottery. It seems likely that this new technique was a response to demand for the newly invented bowls, for it would hardly have been worth the potter's while to develop a streamlined method of production unless he thought that there was a market for the product. So the first prototypes had to be manufactured and circulated, they had to gain sufficient attention to create demand, and the potter then had to respond by further development and innovation. Taking all this into consideration, we may conjecture that considerable time elapsed between the moment of inspiration (stage B of the process) and the production of any significant number of moldmade bowls in the technique that was to become standard (stage E). If that inspiration was prompted by metal bowls that arrived in Athens in 224/3, we would not expect any volume of production of clay copies before perhaps about 220 or even considerably later.

Spratt presents a cash-flow curve—a simple plotting against time of outlay at the beginning of a process and then income as the innovation is established—as a useful model for tracking commercial innovations.[54]

51. See Rotroff 2000, p. 499.

52. Their floral decoration was nearly identical, but three different bowls can be distinguished through differing rim patterns on bowls made in these first molds: leaping dolphin (Figs. 6, 7, and 8, left: P 5813, P 16221, P 11436; Rotroff 1982, pp. 335–336, nos. 1–3, pl. 83); floral scroll (Fig. 8, middle: P 26664, P 27436; Rotroff 1982, p. 336, nos. 4, 5, pl. 83); inverted ovolo (Fig. 8, right: P 34969).

53. P 5813 (*Agora* XXII, p. 50, no. 49, pls. 8, 73). See Rotroff 2000 for further comments on this process.

54. Spratt 1982, pp. 83–84, fig. 3; 1989, pp. 248–249, fig. 12.1.

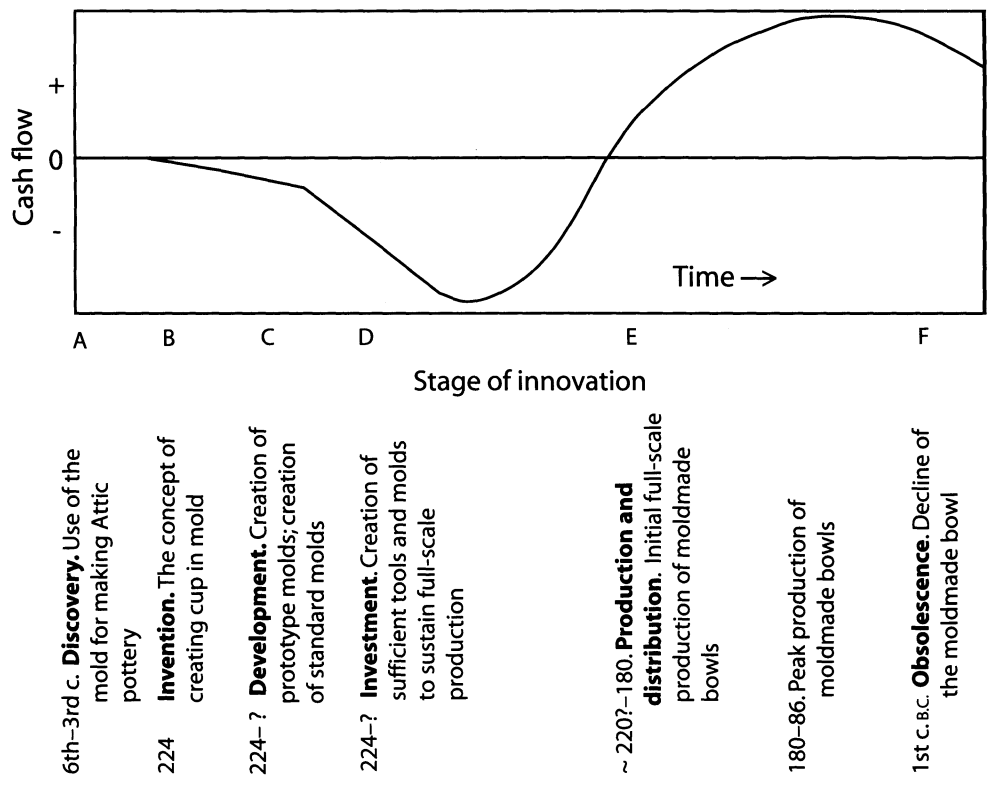

Figure 9. Stages of innovation in the history of the Athenian moldmade bowl

Figure 9 gives his generic curve for a successful innovation, annotated with the stages in the development of the moldmade bowl. The archaeological contexts allow us to control the time factor, and suggest that stages B and C were of very short duration, but that there was a surprising lag in time before stage E—profitable production—was achieved. That at least seems to be the message of the small number of fragments found in Agora deposits dating within the first 40 years of production.

CONCLUSION

A review of the chronology of the Athenian moldmade bowl in light of Finkielsztejn's lowered chronology for Rhodian amphora handles indicates that introduction in 224/3 is still a viable hypothesis. Innovation theory provides models that help in following the process; its application to an archaeological case in which objects and deposits can be dated within a very narrow range, however, poses challenges of interpretation, and explanations of the observed phenomena remain elusive. In particular, it is difficult to know how best to interpret the small number of moldmade bowls in deposits laid down during the first two generations of their production. Does it mean that over 40 years passed before people were making and using moldmade bowls in any significant numbers? Or are the data merely the artifact of the depositional process, a delayed visibility reflecting both the small percentage of material that has survived from antiquity and the amount of time it takes for objects to accumulate in the archaeological record and hence to become visible to modern investigators?

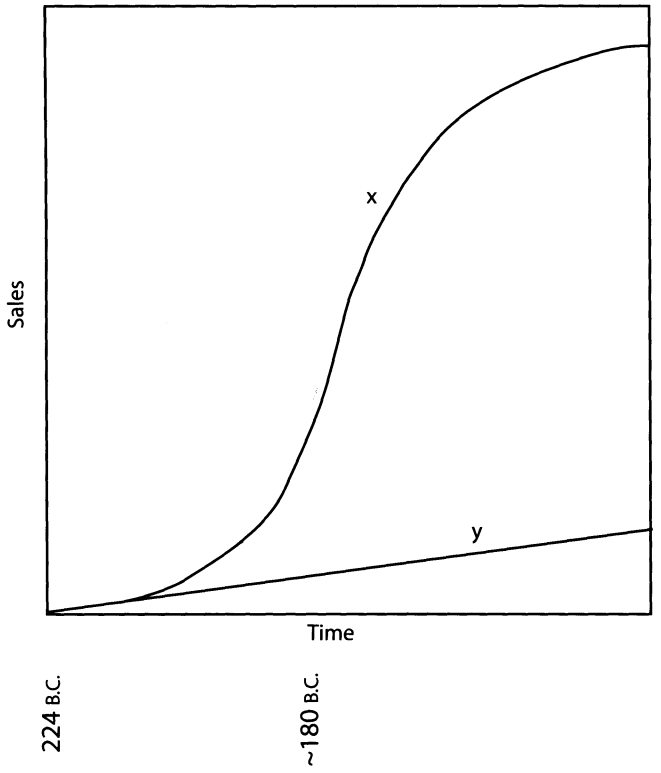

Figure 10. Plot of a successful (x) and a relatively unsuccessful (y) innovation, laid against the time-scale for the Athenian moldmade bowl

If we take the numbers at face value, we would have to conclude that the moldmade bowl attracted little attention and achieved only modest sales for what seems by modern standards a very long time. This can be envisioned with the help of another of Spratt's models, a graph in which successful (x) and relatively unsuccessful (y) innovations are compared in terms of the growth of sales over time (Fig. 10).[55] The two curves overlap at first, but at some point the curve of the successful innovation diverges significantly and rises steeply, as customer satisfaction creates a word-of-mouth campaign. Complex factors influence the point at which these two curves will diverge. In our case, it appears that the moldmade bowl followed the y curve for a long time, before a fairly sudden increase in production in the second half of the first quarter of the 2nd century.

If this scenario is plausible, what would explain the delay? The novelty of the moldmade bowl may have encouraged some consumers to acquire it, but the shape had to compete with a large variety of drinking shapes: West Slope angular and baggy kantharoi, kantharoi with molded rims, and wheelmade hemispherical cups with interior decoration, to mention only the most numerous classes.[56] This vigorous ceramic tradition may have impeded the rapid acceptance of the moldmade bowl in Athens. After the end of the 3rd century, however, production of wheelmade decorated cups decreased dramatically. West Slope baggy and angular kantharoi ceased to be manufactured altogether, and West Slope kantharoi with molded rims and hemispherical cups with interior decoration were made in only small numbers. The mastos and the net-pattern cup, while made in the 2nd century, are rarities.[57] The only drinking shapes manufactured in significant numbers were undecorated: two-handled cups of two different designs

55. Spratt 1982, pp. 82–83, fig. 2; 1989, pp. 250–251, fig. 12.3.

56. *Agora* XXIX, pp. 100–107, 110–117, pls. 17–27, 31, 34–37. For a summary of the chronology of drinking cups, see *Agora* XXIX, p. 481, graph 4.

57. *Agora* XXIX, pp. 108–110, pls. 32, 33.

and an ungainly kantharos with a molded rim and a strap handle.[58] For the buyer in search of something elegant and decorative, there was now little choice other than the moldmade bowl. The new shape had, in the end, beaten out its competitors, but it took more than a generation for this to happen.

It would be interesting to know if this proposed pattern is a common or an unusual one. Spratt charts the delay in the acceptance of various innovations over the past 10,000 years.[59] His figures indicate that the rapidity with which innovations are accepted has increased dramatically through time, which he sees as a reflection of "the acceleration of social processes generally from prehistory into modern times."[60] Perhaps what is in modern terms a long delay—some 40 years—was typical in the Hellenistic period.

It may be, however, that the delay suggested by the stratigraphic data merely reflects the time it takes objects to go from the systemic to the archaeological record and to accumulate in that record in sufficient numbers to be recovered today. If so, the steep increase in numbers documented by deposits in the first quarter of the 2nd century—and which, on the basis of the cash-flow model, we would associate with established production and distribution—actually took place considerably earlier.

It is difficult to know which of these alternatives to prefer, but the example of an earlier innovation—red-figure—provides some support for the delayed visibility scenario. A recent and authoritative handbook dates the introduction of red-figure "around or soon after 525."[61] We have evidence, in the long lists of their works in *ARV,* that the early red-figure painters were productive and commercially successful, yet this ware is only sparsely represented in Agora deposits laid down between 525 and 480. Leslie Shear Jr.'s review of Persian destruction debris tallies 100 red-figure sherds from 21 wells and pits filled with this material.[62] Kathleen Lynch, including in her tally the uninventoried context pottery from larger deposits such as the Rectangular Rockcut Shaft and the Stoa Gutter well, adds about 30 sherds to the total.[63] It is, in any case, a modest collection, but it shows that the craft was well established in 480.

Red-figure is almost completely absent, however, from contexts with earlier deposit dates. Mary Moore published one fragment from a pit perhaps filled in ca. 490, and Lynch notes two small fragments from well V 24:2, deposited ca. 500.[64] Red-figure is not represented among the ca. 255 pieces of Archaic fine ware in the building fill of the Old Bouleuterion, dated on the basis of black-gloss and black-figure no later than 500,[65] and only two uncertain fragments were recovered from below the original clay floor of the nearby Building J, which Shear places in the early 5th century.[66] In short, if red-figure did originate ca. 525, it took 25 years for it to make even a very small appearance in Agora deposits. Indeed, if

58. *Agora* XXIX, pp. 106, 117–119, pls. 29, 30, 38, 39.

59. Spratt 1982, p. 92, fig. 6; 1989, pp. 255–256, fig. 12.5.

60. Spratt 1989, p. 255.

61. Boardman 2001, p. 79.

62. Shear 1993, p. 392, table 4.

63. Kathleen Lynch (pers. comm.).

64. P 17531 (*Agora* XXX, p. 320, no. 1418, pl. 132), a fragment of a cup attributed to the Colmar Painter, from pit J 18:6. The deposit is otherwise unpublished and Moore does not give the basis for its dating. For well V 24:2, Lynch (pers. comm.); *Agora* XII, p. 399; *Agora* XXIII, p. 336.

65. Shear 1993, pp. 419–422, 472–473, deposit H 10:7.

66. Shear 1993, pp. 426, 477–479, deposit H 12:18, lower fill, with ca. 256 pieces of Archaic fine ware.

its inception were to be dated only on the basis of this evidence, it would probably be placed somewhat later—but that is a discussion that reaches beyond the limits of this paper.[67] Other factors may have had an effect on the depositional history of red-figure. Vigorous export would have removed much from Athens, and the nature of the Agora in the late 6th century differed from what it was in the late 3rd. Furthermore, the overall relief decoration of moldmade bowls makes even small fragments recognizable, which is not the case for red-figure. But if the moldmade bowls followed the same general pattern, we need not take the small numbers of fragments in deposits of the last quarter of the 3rd century as evidence for a slow growth of the industry.

One final conclusion remains to be drawn. Whatever may be the case of the marketing of the moldmade bowl—meteoric rise or slow acceptance—the statistics have implications for the way in which archaeologists use moldmade bowls in applying dates to strata or deposits. A single moldmade bowl may indeed indicate that a deposit was laid down after 224/3; but it is important to keep in mind an obvious but often overlooked fact—that the chances that the date is *shortly* thereafter are slight. Stratigraphically, the moldmade bowl is mainly a marker of the 2nd (and 1st) century, and deposits in which it is well represented (unless they are very large ones) should probably be dated after ca. 175.

67. In a recent study Richard Neer (2002, pp. 195–205) points out that almost all of the 56 attributed pots published from Persian debris in the Agora date, on the standard chronology, well before 480; on this basis, along with other evidence, he suggests a shifting of the work of the Pioneers to the years 510–480, although he does not advocate lowering the date when the red-figure technique was introduced.

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