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12.V.89

G 14 : 2

Fartial publications of this well and its contents:

1) Hasperia 1934, p.208 (under the original name of the deposit, A, Well at $14/I\Sigma T$), description, with mention of amphoras that blocked the shaft at depth 3 meters: and pp.294-295, the shape of these (Italian) amphoras is illustrated. and a stamp on one of them is published. The amphoras, together with an accumulation on top of them, are called the Upper Fill of the well. Below them, the shaft mamy was empty for xxxx meters, after which followed the Middle Fill, 2nd to 4th centuries B.C.

2) Agora IV, lamps

Deposit Summarin (Agon) 384 Delivert liste

SAH Depoint list

Susan ELW

3) Agora XII, classical black glaze

4) Agora XXII, Hellenistic mold-made bowls

In 1932 when the well was excavated, the pottery as a whole in the Upper Filling of the well appeared to date still in the 2nd century B.C., and thus provided provided an interesting context for the Italian emphoras.

In Agora XXII under G 14 : 2, Rotroff used the results of recent studies of late Knidian stamped amphoras, which identify some stamp types as apparently a little after 85 B.C. She cites a restored amphora in the Upper Fill of G 14 : 2 (SS 9464, not yet put together in 1934, dated in the term of LEY_BOYAOZ) as belonging to this period. On Knidian stamped amphoras of this late period, cf. Délos 22 27, pp.333-334, under E 96. The eponyms of this period are listed in Hesperia 1985, p.35, under Feriod VI, those marked (C).

The date of the Upper Fill of G 14 : 2 is now moved from before 100 B.C. to latish in the first guarter of the first century B.C.

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with Mac: fool agent at Mp. 7 and 8 21. 11.90 4.01 when I terror martine, so I got hin clim For the during article On 19. VI ma Wallace came to the Stor, and we went through his left of 13. XI. 89 - The mis allocked, and I aired un problems with the figure, we looked at the SS cards ofthe 3 for in my skeller of relation capitation. St seems that the entries of morsel frigues (in pained, by Maggin on the SS card are part of a series - In believes are NG revisions still in 1939, somethin in the records suggester that to lin. I possible trav deaded love was a source of error in my fust capital measurements (see to light list of Again capacité for this prist), (See p. 5 5 mprogradion of his mo. -he has not progra it.) He made new measurements n 1989 of sword Kniding jars, including 2 of 2 3 involved in my proposed article; he did not do SS 6599,) Unit breaks & was on exhibition. he say he can do at during this crait if it can be avranged to have it out of \rightarrow the exhibition for the purpose. It would be descrebe to get all dow by the some melhod - al, anytrow that an true - in you is in Alex.

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4. I. 90 7 Mac's text with his letter 9 13, XT. 89 I would like some simple statunt as L'hav he gets from The capacities I gov for the 3 Agong Building jaws, and which he quotes exactly on p. 6 of This hypocript, to the figures he goes for the same objects on p.5 (553219 and 556610), and n p-9 (356599), Bott hinds an supposed & a 1939 figures apparently - > Chech The SS and the white The figures I wond , I count make any surse of his Test, anylow without this reconciling. I must duch my town source, and just use I, saying and it is.

Dear Virginia:

At length I've sent a revised draft of MAC off to Carolyn and Barbara and given Maggie one (not that she will have much energy for it, her new mini-computer having recently arrived). When all the comments are in we'll be nearly back to where we were in 1982. Partly before but also during revision I was working up a report on measuring Knidian this last July, which came out rather long for the amount achieved. Anyway I enclose both parts---a reasonably factual statement for the record and a rather speculative discussion for amusement (mostly mine).

DUOVIRI

We have a maximum of six usable measurements from the period of the <u>duoviri</u>, and I'm afraid they hint at rather than demonstrate tougher enforcement. On a broader issue I float the possibility that Rhodian passed <u>in Egypt</u> as 8 Attic choes and Knidian as 9, but that leads into Ptolemaic metrology and beyond where I've no time to go now---must get back to publishing Karystian things. In my annual report to the Canadian Mediterranean Institute on the Karystos project I managed to inject some amphoras, because the actual survey work had been so dull, so enclose a photocopy of the relevant page of the CMI Bulletin.

Maggie says the Immerwahrs have completed their stay in the basement without major problem. We've told Don Keller that he can use it when he's in Athens until Maggie arrives (and given him all the usual information). It came out this summer that he and Ingrid have been effectively separated for some time, and that there is another person in his life, Tracey Cullen, currently on leave from being assistant editor at the <u>AJA</u> and in Greece. So you may hear from or see one or both (or, this being a belated letter, have done so).

Talking of belated Maggie didn't seem to think your gold medal would bring you to Boston, in which case we'll get a chance to discuss Knidian and other things not until the end of February, probably.

With all best wishes in the meantime

Mac

Compartin capacity vents, see p. 5

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13/xi/89

DRAFT

i/xi/89

MEASUREMENT OF KNIDIAN AMPHORAS AT THE STOA OF ATTALOS, JULY 1989

Between July 20 and July 25 Jackie Phillips (Fellow of the Canadian Institute 1988/89) and I measured the stamped Knidian amphorae of which we thought (1) we could determine the original capacity reasonably closely and (2) the date was ca 150 B.C. or later. We followed the methods described in the "Measuring Amphora Capacities" draft of (mostly) 1984 with some improvements suggested by JP.

Water Measuring

We found the 500 ml. cylinder with a chip out of its mouth held 496 ml., using the 500 ml. volumetric flask (no carbon, original left at Stoa) and then measured with it the small semijohn, which averaged 9 cylinders - 110 on three tries (-108, -112, -110), or 4,850 ml. (In 1978 our value, using an unchecked cylinder) was 4,875.) The new large demijohn (in a plastic case) held an average of 5 SDJ + 425 ml on two tries (identical result, given as halfway between 420 and 425; an initial result was +385 +?20) or 24.675 ml.

Not many jars could be measured with water. We did SS06608, SS07210, and SS09745. (The first two jars each began to leak during attempted second measurements, as did P16625 on a first attempt. SS09743, lurking in the relief marbles <<CG: what name has this?>>, has a hole, as does SS09367 in Shop 4. Both these have been measured with water before [see below] and probably could be again, but we decided not to try to get triple water measurements of them.)

We placed each jar in a vat, rinsed out its interior, filled the vat to about the level of the jar's shoulder, filled the jar, left it for half an hour or more, and topped it up before measuring. (The absorption of water into the clay walls was quite audible to begin with, and we waited until all was quiet. We have a couple of notes on topping up, for SS07210 and P16625, which are not useful.)

The three measurements of SS09745 had a range of 40 ml. (compare a mean range of 52 ml. in eight sets of triple measurements at SRAC 302).

Dry Measuring

The three jars measured with water were measured also with polystyrene pellets to establish an inference from such dry results to actual capacity for jars that could only be measured dry. (Note however that while the jars that had wet measurements had been rinsed the rest were not, and their inferred capacities will be a shade low as a result.)

8.03

All measurements used were taken with JP pouring. In two cases a pair of her measurements was compared against a pair of mine: SS06600 JP 60 cups - 110 ml., 60 cups - 120 ml., MBW 60 cups - 180 ml., 60 cups - 145 ml.; SS09745 JP 59 cups - 410 ml., 59 cups - 480 ml., MBW 58 cups - 80 ml., 58 cups even. The discrepancy is under 1/4% and it does not seem desirable to lower all JP results 1/8% (ca 35 ml.) on this evidence.

The cup used was the original Baltimore cup, and the polystyrene pellets were from CGK's ASCS storeroom knapsack. The Stoa files record repeated measurements of different jars with different polystyrenes and different cups, from which no general conclusions emerge (e.g., with the "new Athens polystyrene" unstirred measurements to the rim made the Baltimore cup appear to hold 13 ml. more than the Cyprus cup when measuring the little Thasian (SS14825?) but 9 ml. less when measuring the largish Corinthian (?AP3027). Five spot checks on cupfuls used in measuring SS06608 and SS06613 gave just over 500 ml. and the sixth was exactly 500 ml. I have used a cup value derived solely from equating the wet and the dry results for SS06608, SS07210, and SS09745, thus:

Table 1: Wet-Dry Equivalents SS06608 - wet 31.075 ml., dry 63 cups - 320 ml. 63 cups - 280 ml. Average 63 cups - 300 ml. So 1 cup = 31.375/63 = 498.0 ml. SS07210 - wet 31.085 ml., dry 63 cups - 470 ml. 62 cups - 100 ml. Average 62 cups - 65 ml.* *(assuming 1 cup = 500 ml.) So 1 cup = 31.150/62 = 502.4 ml. SS09745 - wet 28.685* + 135 (calc. for 2 cm. of rim missing) = 28,820 ml. *(average of 3 best, taking residue as 143 and $2 \times [163 + 173 + 183/3] = 173 + 173)$ dry 59 cups - 410 ml. 59 cups - 480 ml. Average 59 cups - 445 ml. So 1 cup = 29.265/59 = 496.0 ml.

Mean 498.8 ml. But if we weight SS9745 three to the other two jars' one each, the value becomes 497.7. Capacities were calculated and entered on the sheets and in the AIC GAF files using 497 (through forgetting to include the 135 ml. calculated volume) not 498 or 499---see final para. for effects. Not rounding is the opposite decision to that of <u>Hesperia</u> 1982.

A lowish mean is perhaps partly explained by better filling of the jar. We noted on SS09752 "We put a clear patch over a hole on the shoulder and it filled quite well, though a bit better after tapping and stirring <to avoid confusion, note that this was done only <u>after</u> the unstirred measurement had been recorded>---Knidian less refractory than Rhodian."

The ranges of pairs of dry measurements by JP were as follows: SS06600 10 ml., SS06608 40 ml., SS07210 130 ml. (assuming cup=500), SS09745 70 ml.: MEAN 63 ml. (data at <u>Hesperia</u> 1982 312) give the mean of nine pairs of measurements as 89 ml.)

Results

Table 2: Capacities, Heights, and Diameters (a) ca 150--108 B.C.

SS	03214	29.250x	0.854	0.340
SS	03215	28.900x	0.892	0.344
SS	03216	28.300x	[0.843]	0.336
SS	03217	32.050x	0.926	0.340
SS	03219	30.900 - Mar	0.943	0.341
SS	06168	28.050x	[0.881]	0.318*
SS	06600	29.700	0.919	0.334
SS	06601	30.900	0.945	0.338
SS	06602	33.850	[0.940]	0.350
SS	06603	28.900	[0.857]	0.330
SS	06606	28.400	0.914	0.324*
SS	06608	31.100	[0.862]	0.339
SS	06613	32.250x	0.892	0.333
SS	07210	31.100	*	*
SS	09743	30.100	0.907	0.334
SS	09744	31.700c	0.930	0.338
SS	09745	28.700	*	*
SS	09750	28.900x	[0.866]	0.334
SS	09752	30.150	*	0.336
SS	09755	29.650	[0.897]	0.336
			(b)	After ca 108 B.C.
SS	02272	30.550	[0.856]	0.339
SS	06604	30.450c	0.913	0.331
SS	06610	31.200c	0.900	0.328

All figures are rounded to the nearest 50 ml.x = jar with somewhat extensive restoration; c = result including a calculation of the volume of the upper neck (as at <u>Hesperia</u> 1982, 307); on the ([] = pH; * = check in Athens in winter 1990.) The mean of the 12 main of the

Previous Capacity Measurements of These Jars

Other capacity measurements of Knidian jars at the Stoa were taken at least in 1939, 1954, 1956, 1978, and 1987; of these VG's in 1939 form the much largest comparison group. 13 jars were measured dry both in vi/39 and vii/89.

8.05

Table 3: Comparison of 1939 and 1989 dry results

Inv No	1939	1989	Diff.	
SS3214 SS3215 SS3216 SS3217 SS3219	30.450 28.750 28.200 31.550 30.550	29.265 28.920 28.280 32.065 30.880	-1.185 +0.170 +0.080 +0.515 +0.380	? 29,875
SS6600	29.760	29.710 29.700	-0.055 (av.)	
SS6602 SS6603 SS6604 SS6606 SS6608	34.250 28.900 30.550 28.000 21.350	33.830 28.885 30.430 28.375 31.030	-0.420 -0.015 -0.120 +0.375	
SS6610 SS7210	31.650 310 30.250	30.990 31.180 30.840 30.710	-0.330 (av.) -0.470 -0.525 (av.)	

The results for SS03214 are more than a liter different, and something specific is almost certainly wrong, as the greatest discrepancy in the other 12 is 525 ml. The mean of the 1939 results is lower than the mean of the 1989 results for the 12 by 52 ml. Doubtless the Table 2 results for individual jars should be modified using the 1939 results, but the interpretation should not change significantly; the two groups of results are mutually confirming to the accuracy expected.

DRAFT

1/xi/89

(What follows is reflections on the data in mbwvii89.st, and Tables are number consecutively with those in it.)

Purpose

We wanted to explore Virginia Grace's hypothesis that mean gross capacity increased between late Period V and early Period VI. To quote from my note of 9/vii/88 "VG points to two cases where the same fabricant made a jar with a smaller capacity just <u>before</u> the period of the <u>duoviri</u> (V late) and one with a larger capacity just <u>after</u> (VI early) and where one can see the same marked change in profile in both pairs, to a higher Dmax with a fuller body below.

ine pairs are	fab	ер	Н	D	Cap	
AlexMus 11,792	Aineias	Hierokles	0.887	0.33	28 360	> this as
SS6599	"	Sosiphron	0.923	0.337	31.225	26-3im
						[2 gin
SS3219	Dionysios	Diokles	0.94	0.337	29.875	(30,07 80)
SS6610	n	Hipparchos	0.902	0.319	31.025	

The three Stoa of Attalos figures are all VG wheat 1939 unrevised."

Other Relevant Measurements

Some jars that should date 150 B.C. or later that had been measured on previous occasions were not remeasured in July '89, though they still could be, either because they were unstamped, or because of their condition (lacunose or much plastered), or because they were on exhibit in Shop 4. No jar depends solely on a ML1954 barley figure and as all are low none is included; otherwise all data I have are cited.

Table 4: Comparanda (a) ca 150--108

Inv no	Reason not done	Data (f:	inal est.	. underlir	ned)
SS03213	condition	<u>32,250</u>	wheat	VG/vi/39	
SS03218	condition	30.825	wheat	VG/vi/39	
This figure was	apparently <u>not</u> revised 3	because	VG regai	rded it	51
as of marginal w	use; with revision it wou	uld have	been 31.	.450. Say	
		<u>31.450</u>			
SS06605	different denomination	20.900	wheat	VG/vi/39	
SS09367	in Shop 4	33.525	wheat	VG/vi/39	unrev
		33.460	water	VG1956	
		33.590?	water	PMWM1987	
		34.530?	ps	PMWM1987	

? is query about values for containers. I've used 24.675 for the large demijohn and 515 for the Cyprus? cup (where the vi/81 memo used 500 for MBW1978 figures that has also been altered) and shall pretend that the value is 33.500?

8.08

25.400 ps PMWM1987 in Shop 4 SS09461 different denomination MBW1978 SS09569 condition 32.825? ps 31.330? ps MBW1978 condition SS09751 SS09753 different denomination 23.425? ps MBW1978 23.495? ps MBW1978 23.450? P16625 unstamped, leaked 28.220 water ML1954 28.175? ps MBW1978 28.200 P25750 unstamped 29.170 ps MBW1978 P25751 unstamped MBW1978 29.435 ps

Museum 11,792 not in Athens <u>28.360</u> water VG1955 (the VG1939 water result of 28.800 may be high because of absorption?)

Alexandria

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(b) After 108

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Discussion of Results

It is evident that most of the 38 jars mentioned have capacities of roughly 30 liters but some do not. It has long been evident.

From the 20 jars of ca 150--108 measured in 1989 I exclude SS06602, Cap 33,850 ml. on three grounds: it stands out visually in its row as larger and has larger linear dimensions, it has a capacity grafitto as if it were unusual (see below), and its capacity is actually almost four liters above the mean of the rest, over a liter and a half larger than the largest. (SS09367 at 33.500 liters and probably SS09569 at 32.835 liters will belong to this denomination. In calculating it note that VGvi39 revised gave 34.250 for SS06602.)

The mean of 19 jars measured was 29.95 l., with one

standard deviation +/- 1.32 l. The smallest jar, SS06168, held 28.05 l and the largest, SS06613, 32.25 l.

8.10

Taking both 1989 and other figures and grouping by eponym, we have 4 jars of Apollodoros (SS06600, SS09367, SS09751, SS09753), but neither the second nor the fourth belongs plausibly to a group with a mean of ca 30 liters---3 jars of Diokles (SS03217, SS03219, and SS09743) with a mean of 31.02---4 jars of Menekrates (SS03215, SS06601, SS09745, SS09755) with a mean of 29.54.

As for jars from after ca 108, taking only 1989 figures the three jars have a mean of 30.75. 31,25Taking both 1989 and other figures, the six jars have a mean of 30.47.

The various means above help to suggest that the actual mean capacity of the Knidian amphora fluctuated somewhat. One might say, perhaps, that the jars of the year of Menekrates in later Period V would not be at home in Period VI as far as we can tell. If we follow <u>Hesperia</u> 1982 and <u>AJA</u> in deducting est. lining and stoppering of the order of 1 1. we can suppose that the Knidian standard was ca 28.5--29.5 1. If we take the grafitto on SS06602 to suggest that ca 34 l gross or 33 l net was 8 Knidian choes, the chous will be slightly over 4 l. (not much, noting that the two other large jars aren't quite so large). A standard that stood as 5 to 4 Attic (with a chous of 4.075 if the Attic is 3.260) and therefore 7 to 8 with the Aiginetic (at 10 to 7 with Attic) would in numismatic terms be called double Phokaian (compare the first guess at AJA 1987, 55, that the Serce Liman jars were 18 and 5 Phokaian choes, perhaps to be rephrased 9 double-Phokaian choes and 30 double-Phokaian kotylai). The official size of the seven-choes jars would be only ca 28.5 l., with six choes ca 24.5 (cf. SS09461 and SS09753) and five choes ca 20.5 l (cf. SS06605). But this is much too speculative.

All it is safe to say is that the gross capacity of the regular Knidian amphora in the late Hellenistic period from ca 150 at least was almost exactly 30 liters with 1 s.d. ca. 1 1/3 l., and that there are possible signs of fluctuation that include a likelihood of greater care but the old standard under the duoviri.

As notes for further study, however, one might mention

(1) that a net capacity of 29.5 (my own tendency is to expect the official norm at the high end of the actual range)

8.11

would pass in some quarters as 9 Attic choes whatever it was in local Knidian terms (e.g., $3.260 \times 9 = 29.340$).

(2) Knidos was generally under Ptolemaic "influence," and Ptolemy 2 had promulgated a standard of that size between Arsinoe's death in 270 B.C. and 250 B.C., the editors' date for <u>PRyl</u>. 4.564 (partial photocopy attached), which shows clearly that 1 6-choes metretes of Arsinoe = 9 Attic choes.

(3) The Rhodian standard, which must have been easy to handle in Egypt, was, we think, officially 26+, which would pass as 8 Attic choes (e.g., 8 x 3.260 = 26.080).

(4) ps.-Heron <u>Stereometrica</u> repeatedly insists that a <u>keramion</u> = a cubic pous = 48 Italic <u>xestai</u> (<u>sextarii</u>)---e.g., 1.47, 2.30.5. The date(s) of the calculations are uncertain and quite likely Imperial, but the way in which the jar and foot are assumed and only the strange/recently adopted (?) Italic unit so named suggests the possibility that a Ptolemaic <u>keramion</u> had long equalled a Ptolemaic cubic pous. In that case, since at Rome 48 <u>sextarii of 540+ ml. = 1 amphora</u> of 26+ 1. = 1 Roman cubic pes of ca 0.296 m., the Ptolemaic jar was of 26+ 1. and the Ptolemaic foot about 0.296 m.

(5) No wonder, then, that the Ptolemaic tax <u>trierarchema</u> was levied <u>per keramion</u> and that wine in the papyri is normally recorded by <u>keramia</u>; probably the majority of the actual containers were Rhodian jars of 8 Attic choes. (6) A check on this from the amphoras themselves is to try to make sense of Knidian and Rhodian linear dimensions in terms of various feet (of which 0.296, with 0.326, and 0.350, is in the small group of most often met).

(a) Now the Rhodian amphoras in <u>Hesperia</u> 1982 from the 230s to ca 200 generally have depths about twice their diameters. If we choose (again) the upper end of the range, with Xenotimos' diameters of up to 37 cm. and Mikythos' depths of down to about 73 cm. we have depths of ca 2 1/2' and diameters of 1 1/4' (actually I'm tempted to think that the operative measurement is a greatest <u>circumference</u> of 4'---7/22 x 4 = 1.27, close to 1.25).

(b) For the Knidian of this note the diameter goes up to 34 cm. and the depths down to ca 84 cm or depths of ca 2 3/4' and diameters of 1 1/8' (again I prefer <u>circumferences</u> of 3 1/2'---7/22 x 7/2 = 1.11, close to 1.125).

(c) To throw in the Zq- group, diameters are 43 cm. and depths ca 67 cm--possibly depths of 2 1/4' and diameters of 1 1/2' (again I prefer <u>circumfernces</u> of 4 1/2'--- $7/22 \times 9/2 =$ 1.43, not close enough to 1.50, so if the diameter was taken I expect it was taken as 1' 7" = 42.6 cm. rather than 1 1/2' = 44.4 cm.). But this is suspect since I don't see the Zq- group capacities as making much sense when converted onto an Attic or Attic-adaptable standard.

8.14 14

(7) Clearly what is needed is a stiff dose of Ptolemaic metrological investigation. But it may be worth noting that the Roman weight standard seems to me clearly derived from the Eastern Med. and that I suspect the same basic conveniences of underlying Babylonian, Achaemenid, Ptolemaic, and Roman metrology. After all 3 early (ca 200 B.C.) denarii = 1 Rhodian tetradrachm. / ΜΠΙΚΟΓ μετρητάς (Οωσεκαχους) τρυγίου κερ(άμια) η καὶ ὑπαρχεν ἀπὸ τοῦ εἰς [Μέμ]φιν μετρηθέντος ὄξους τρυγὸς κερ(άμια) δ ὦστ' εἶναι τὰ ὑπάρχοντα ἐν ταμιήοι(ς) τρυγὸς κερ(άμια) ιβ καὶ τὰ εὑρεθέντα ὑποζ(έ)οντα κερ(άμια) γ

~11-

'Year 36, Pachons 25. Account of the sour wine which was measured out to Horus on the estate of Sostratus: contents of 62 jars, 10 Theban jars, 6 half-jars; and in another storehouse 17 jars, 19 halfjars; total 89 jars, 25 half-jars; deduct as produce of diseased grapes 2 jars, remainder 87 jars, 25 halfjars. These when measured out came to 82 jars containing 78 six-chous metretae of Arsinoe, equal to $58\frac{1}{2}$ twelve-chous Attic metretae; 8 jars of lees; and from the sour wine measured out for Memphis there were left 4 jars of lees, so that the amount of lees now in the storehouses is 12 jars; and 3 jars which were found to be fermenting.'

2. Sostratus was a friend of Zenon and joint owner with him of a large vineyard.

5. $\Theta\eta\beta a i\omega\nu$ is written over a deleted word.

20

25

16. Apouvons: perhaps the standard measure kept in the temple of the goddess Arsinoe, like the artaba called $E_{\rho\mu\sigma\vartheta}$. It cannot be the measure used in the $a\pi\delta\mu\rho\rho\sigma$ of Arsinoe, which contained 8 choes. There is perhaps a reference to the Apouvouko's $\mu\epsilon\tau\rho\eta\tau\eta'$ s in P. Cairo Zen. 59271.

17. This line is interpolated. It appears from the equation that 1 Ptolemaic chous = $1\frac{1}{2}$ Attic choes, which, so far as I know, is a new metrological datum.

19. Read $i\pi\eta\rho\chi\epsilon\nu$ rather than $i\pi d\rho\chi\epsilon\iota$.

21-2. In the left margin opposite these lines are the figures $\lambda \theta \ (= \frac{1}{2} \text{ of } o\eta \text{ in } 1. 16)$ and below, $\iota \theta \angle \ (= \frac{1}{2} \text{ of } \lambda \theta)$. 24-5. Cf. BGU. 1549, where $\dot{a}\pi o \zeta \dot{\epsilon} \sigma a \nu \tau a$ must surely mean 'after fermentation'.

'Deinon to relapse. Now expecting you health is soun
know that we
 2. ὑποτρο]πά πιάσαι. 4. Probably or ϵἰδζϵί>ημεν. 8. The end α not too long.

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4.

9

The writer receipt is a spondent.

running trenches at the North Harbour site: Dr. John Humphrey and Dr. Laura McLeod, U. of Calgary, worked on Turkish tobacco and narcotics pipes and human remains respectively (she cleaned and restored the "vampire" found last year); Dr. Gerry Schaus, Wilfrid Laurier, con-tinued his work on archaic pottery as well as directing trenches and preparing for future work at the site of Eressos; Donald Sedgwick, Concordia, directed trenches and advised on computerizing our records; and Ms. Carol Brynjolfson, now a conservator at the Brooklyn Museum, used her annual leave to continue her studies of the terracotta figurines. Ms. Susan-Marie Cronkite was area supervisor for the excavations in the castle and continued her work on Demeter sanctuaries for her Ph.D. thesis at the University of London. Mme. Maria Toli, CAIA, spent a week with us working on loom weights, some of which this year were decorated with impressions from gem stones stamped on them. We are also pleased to announce our first Mytilene marriage: our architect since 1986, Mr. Richard Anderson, and Ms. Iva Matkovic, a Ph.D. student at McMaster and trench master in 1986. Mr. Anderson has also just been appointed architect for the Athenian Agora excavations, a prestigious position at one of Greece's most important sites. Ms. Monica Smith, Toronto, continued as our chief conservator, aided by Ms. Linda Berko, Queen's University, and Mlle. Sylvie Dumont continued as draftswoman.

We are grateful to the Social Sciences and Humanities Research Council of Canada for again funding our work and to the Central Archaeological Council of the Ministry of Culture, Athens, for issuing the permit to carry it out. Once more we are most indebted to its local representatives, Mme. Aglaia Archontidhou and her staff, for their co-operation and assistance. The Canadian Archaeological Institute at Athens obtained the permit and Mme. Toli provided her usual valuable assistance.

Hector Williams, University of British Columbia

Gni Boll 1X.4 [apa] The Canadian Karystia Project - 1989

For earlier activity, see CMI Bulletins VII. 4 [1987] and VIII. 4 [1988].

Les travaux du projet Karystia se poursuivent par l'étude des résultats obtenus précédemment, et le début d'une nouvelle phase proposant une étude sur trois ans des grands axes d'échange, dans l'espoir de détecter les changements d'époque.

In 1989 we went on with the study of our previous results and also began a new phase of the project. Four papers were given to the Archaeological Congress at Baltimore in January about the intensive survey and excavations on the Paximadhi Peninsula that forms the western arm of the great Karystos Bay in Southern Euboia; in particular, on the Classical farm complex there, interesting both for rural land use and as possibly one of the most visible remains of Athens' imperial presence overseas in the age of Perikles. Work continues on a volume giving final, formal publication.

In our second phase we are moving away from the Paximadhi peninsula to find out about patterns of land use in the rest of the Karystos area. We have pro-posed a three-year survey of the routes between centres of population and activity in the Karystia in the hope of detecting change over time and particularly change between the Archaic and Classical and the Classical and Hellenistic periods, both for its own sake and with particular reference to the sudden spread and later marked decline of farming on the Paximadhi peninsula in the Classical period.

We started with the eastern arm of the Karystos Bay, and in particular with the route across it to Karystos' main international port, Geraistos (modern Kastri), and are pleased to have identified much of the most direct main route, including a stretch of ancient paving near Geraistos (something pretty infrequently reported from the Greek countryside). Other routes were traced as well, and, naturally enough, a good many sites turned up along them. Lively discussions about function ensued, but, of the hypothetical roadside pottery shop, restaurant and monastery, none (at



Hellenistic figurines: woman and child



10

least as yet) have been granted any status beyond "possible."

Among the usual coarse and plain pottery sherds one sort of find was notable by its near absence — the distinctive toes and handles, often stamped, belonging to the large amphoras so characteristic of the international wine trade in the Classical and Hellenistic periods. This season, in fact, we had to make do with a single slightly misshapen toe. By chance I was at the time just completing a study of the capacities of Knidian amphoras, undertaken under the guidance of Miss Virginia Grace and with the assistance of Jacke Phillips, which emboldened me to identify it as having belonged to a jar containing about thirty litres of wine from Dorian Knidos in south-western Asia Minor, A few handles with stamps including the word "Knidian" had previously been found, but most of the main exporting states are unrepresented. Were the ancient Karystians unwontedly abstemious? Or did they simply see no point in paying extra for most imported wines? Good wine is certainly produced locally today. Or was the wine transferred from amphoras to skins at some small harbour we have not yet explored? We shall keep looking.

Our group was particularly international this year; in addition to the usual Canadians and Americans and our Belgian architects and British and Dutch academic visitors we were glad to welcome five German students from the Universities of Freiburg and Munster for three weeks in the field.

We worked under a survey permit granted by the Greek Ministry of Culture and Education. We are grateful for the support and cooperation of the Ephor of Classical and Prehistoric antiquities for Euboia, Dr. E. Sakellaraki, and her staff, and of the Director of the Canadian Institute, Dr. J. Perreault, and the Assistant to the Director, Mrs. M. Toli. We also wish to thank the Karystos museum guard, Mr. Sarandis; our other friends in Karystos; and the excavation volunteers - all these made the work possible.

Malcolm Wallace, University of Toronto

STAMPED WINE JAR FRAGMENTS

147

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128 (?) B.C.

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of Athens or probably even with the slightly earlier (88 B.C.) destruction by Mithridates of Delos, since finds indicate that Athens and Delos were by a long way the principal markets for Knidian stamped jars of the period.

The nature of the special endorsement of the *duoviri* period has been given brief mention.²³ It consists of an extra pair of names which usually changes with a change in eponym, i. e. presumably we have to do with annually appointed pairs of commissioners, though one or both of a pair seem sometimes to have been carried over to another year. The paired names are sometimes accompanied by a title, usually $d\nu\delta\rho\omega\nu$ (cf. 174, 187-188) occasionally $d\rho\chi\delta\nu\tau\omega\nu$ (Grace, 181-183). There being now four names involved, along with ethnic and device and sometimes title, the information is, more often than in previous periods, divided between the two handles of the jars, most of which of course have since broken, leaving us to reëstablish pairs of types by matching devices,²⁴ etc.

Since we now know most if not all of these *duoviri* named on Knidian jars, and since the eponym terms of most of the pairs have been quite firmly established, I append an alphabetical list of the pairs in concordance with the eponyms that dated their period of office, and a reverse list, alphabetical by eponym. Asterisks mark such of these names as appear on Knidian stamps only at this period and in the function indicated (eponym or *duovir*), boldface numbers refer to examples in this catalogue, and numbers in plain type to examples illustrated in *Hesperia*, III, 1934 (Grace); of some of the latter, readings in the text, incomplete or lacking, have since been restored from better preserved duplicates. Note also citations from Kent's article (see Bibliography).

DUOVIRI	PUBLISHED EXAMPLES OF DUOVIRI	Eponyms -x.74
 'Αγαθόδωρος-'Απολλώνιος 'Αγαθοκλῆς-Θεύκριτος* 'Αγησίπολις*-'Ερμίας "*-'Ερμόφαντος 'Αγίας-'Αριστογένης 'Αθανόδωρος*-'Απολλώνιος 'Απολλόδωρος-Διόγνητος* 	165 223	Ephódavros? or 220 consinge? Sutor) Διονύσιος ^A νδρομένης ^C clob 'Apistokpety's (TD 6484 ^A ρίσταινος ^E ρμόφαντος ^A νδηριόκη ^C τος ^A ^A νδηριάτος ^A νδηριότος ^A νδηριάτος ^A νδηριδος ^A νδηριδος ^A νδηριδος ^A νδηριδος ^A νδηριδος ^A νδηριδος ^A νδηριδος ^A νδηριδιος
8. " " * (1). [°] Απολλώνιος- [°] Αγαθόδωρος (6). " - [°] Αθανόδωρος*	186	Πίσινος? Έρμόφαντος? (π. εbra.) Έρμόφαντος
9. 'Αρίσταινος-Ἐρατίδας* 10. 'Αριστεύς-Βάκχιος*	179	Δαίδαλος Θεύπομπος

the second century B.C., on which see recently M. Crosby, "An Athenian Fruit Measure," Hesperia, XVIII, 1949, pp. 108-113.

²⁸ See Hesperia, Suppl. VIII, pp. 183-184, note 35.

²⁴ We have a sufficient number of stamps in which all four names are together (cf. Grace, 130; B.C.H., LXXVI, 1952, pl. XX, 9), and jars, whole or fragmentary, on which pairs of supplementary types are preserved, to give us solid grounds for guessing at further pairs.

SMALL OBJECTS FROM THE PNYX: II

	1.11	PUBLISHED	
	Deserve	EXAMPLES	
and the state of the state of the	DUOVIRI	OF DUOVIRI	Eponyms
11.	'Αριστόβουλος*-Μελάντας	185, 190	Έρμων
12.	" *-Μόσχος		'Αλέξανδρος
(5).	'Αριστογένης-'Αγίας		'Αρίσταινος
13.	'Αριστοκλής-'Αρτέμων	185; p. 300, 8;	Avias
		Kent. no. 15	11/103
(13).	'Αρτέμων-'Αριστοκλής		"
(10).	Βάκχιος*- Αριστεύς		Maimaumaa
	Δαμάτριος-Εύφρων		Suchantes Araddes (Tologa)
>15.	Δαμά (τριο) s-Κυδοσθένης*	181-183	Zwordpurt !!
Ayry Ty 105 turs (15).	Δημήτριος- "*	180	
petronym (1) - (7).	Διόγνητος*-'Απολλόδωρος		A A A A A A A A A A A A A A A A A A A
147 2011 (8).	"* "		Tiguno ?
16.	Διονύσιος-Φιλόπολις*		
(9).	Έρατίδας*-'Αρίσταινος		110/11/15
(3).	Έρμίας-'Ανησίπολις*		
17.	" -NuragiBoulas		Ανορομενης
~ 18.	" "		E
1 ×1.62 (4).	"Equidantor" Ange () *		Ίππαρχος (ο Διονυσίου)?
Formers - "AVTANDPOS 19	Eißen) og Kannel	107 100 011 010	Avopopévns (and Acistokperne)
20	Elponnos-Kapreaoas	187, 188, 211-212	Πίσινος
20.	Hokpaths-KAEUTOALS	104 104 100	Στρατοκλής
11. Hereiter 1997	-110Auxappos	164, 174, 130;	'Αριστομήδης
		p. 275, SS 323;	
22	T2-11 + 11 +	Kent, no. 10	
(14)	Ευπολεμος -Λαχης*	Kent, no. 7	Euppayópas or Grandstag
(1τ) . (2)	Δυφρων-Δαματριος		Zwaippor?? > Anodda [
(2).	The	150	Διονύσιος
20.	μασων-Καλλιππος	158	Πολίτας
25	"Inderna K K)	188	Αριστοκράτηs
25.	ιπποστρατος -Κλευπολις		Στρατοκλής
(23)	-Πολυχαρμος		Apiorounons on Kedd. mydys
(23).	Καλλίππος-Ιασων		Πολίτας [an up nich]
(19).	Kapveaoas-Eusoulos		Πίσινος · · · · · · · · · · · · · · · · · · ·
(20).	ΚΛευπολίς-Ευκράτης		Στρατοκλής
(23).	- 1ππόστρατος*		"
27.	Κρατερος -Νικασίβουλος	160	"Ιππαρχος (δ Διονυσίου)
20.	Κρατης -Πολίτας-της	184, 189	'Αλέξανδρος
29. 30	" *	163	Δαμόκριτος
50.	*-Πονοσυλέτης*		"
• (15).	Κυοοσθενης*-Δαμά (τριο)s		Σωσίφρων
(22)	usually Δημήτριος		
(22).	Λάχης*-Εύπόλεμος*		Εύφραγόρας
(11).	Μελάντας- Αριστόβουλος*		Έρμων
(12).	Μοσχος-Αριστόβουλος*		'Αλέξανδρος
(24).	Μυστης*-Ίάσων		'Αριστοκράτης
(17).	Νικασίβουλος-Έρμίας		E
(18).			⁷ Ιππαρχος (ό Διογυσίου)?
(27).	-Κράτερος*		⁴ Ιππαρχος (δ Διονυσίου)
(28).	Πολίτας (-της)-Κράτης		Άλέξανδρος
(29).			Δαμόκοιτος
CHILL & BRITCHARD AND AND AND AND AND AND AND AND AND AN			1

148

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149

STAMPED WINE JAR FRAGMENTS

•		Published Examples	
	DUOVIRI	OF DUOVIRI	Eponyms
(21). (26).	Πολύχαρμος-Εὐκράτης "΄΄΄ Γππόστρατος		Αριστομήδης "
(30).	Πονοσυλέτης*-Κράτης*		Δαμόκριτος
$Fok(\lambda_{3}^{s}) > 31.$	Πυθόκριτος-Τηνάδης*		Κλεύπολις
. ((31).	Τηνάδης*-Πυθόκριτος		"
4-15) (16).	Φιλόπολις*-Διονύσιος	and the second	Πολίτης
and m)		Published Examples	
	EPONYMS	of Eponyms	Duoviri
1.	'Ayías	182, 172, 173, 214; p. 300, 8	'Αριστοκλής-'Αρτέμων'
2 2.	' Αλέξανδρος*		'Αριστόβουλος-Μόσχος
3.	" *		Κράτης-Πολίτης
3 4.	'Ανδρομένης*		'Αγησίπολις- Έρμίας
1 Anolisty	" * -	154	" - Epuópartos - Fuchpaul
5 6.	'Aρίσταινος	183, 171	'Ayias-'Apiotoyéns A= p ((7 2 60 63)
5 7.	'Αριστόδαμος*		'Απολλόδωρος-Διόγνητος
7 8.	' Αριστοκράτης		láσων-Múστηs also Axyouralis-Eμόροιτο.
8 9.	'Αριστομήδηs*	164 = 130, 219	Εὐκράτης-Πολύχαρμος (TD 6487)
. 10.	**	States and the second second	Ίππόστρατος.
1 11.	Δαίδαλος*	cf. 175	'Αρίσταινος-Έρατίδας
10 112.	Δαμόκριτος	159, cf. 176; 202	Κράτης-Πολίτας-της
13.	" later our		" - Hovoruherns by The Store Ecres of
ALOUVOUR 14.	Διονύσιος	176	'Ayaboking-OEUKpiros or Aaxys - Lundarys
13 15.	El	Burger and the second	Έρμίας-Νικασίβουλος
16.	Έρμόφαντος	154	'Αθανόδωρος-'Απολλώνιος
17.		153	Άγαθόδωρος- ?
18.	Έρμων	184	Αριστόβουλος-Μελάντας
19.	Εύφραγόρας	186, 168, 170, 210	Εὐπόλεμος-Λάχης
17 20.	Θεύπομπος		'Αριστεύς-Βάκχιος
21.	1ππαρχος* ο Διονυσίου	132; p. 305, no. 8	Κράτερος-Νικασίβουλος
14 Kaharpy 22.			Epplas- "In no or KT is a low 15
19 14 23.	Κλεύπολις	cf. 156	Πυθόκριτος-Τηνάδης
24.		188, 213	Εύβουλος-Καρνεάδας
25.	+r	A CALL CALLS AND	'Απολλόδωρος-Διόγνητος
21 27	Πολιτας	157, 174	Ίάσων-Κάλλιππος
22 20	Πολιτης	180-181	Διονύσιος-Φιλόπολις
28.	атратоклузт "*	cf. 161	Εύκράτης-Κλεύπολις
23 30	Swaid own*	ct. 161; Kent, no. 2	Ίππόστρατος-
50.	μοιφρων.	146	Dapar (prides or (9. 6.14, and)
31.	" ? *		Δημήτριος-Κυδοσθένης
	-		- samutpios-Buppor

It can be taken as established that the general date of this group is late second early first centuries B.C. Every one of the terms is represented from Delos. Nearly all have been identified in one or more Sulla-destruction deposits at the Agora, but none

1) 25. X. 74 Note Type of Diothoopides up 'Audpoprings seemed to fin with bruch type name, 'Agadobaspos But This would be first the Anoddivisios solt of during for 1 ep.

12 Avdpis stamps where one name is in gen and the other in naminde 1) KT 1531 cluster Apisloborgon-Migarias 2) Aprèvle/v Kuboodélieus da places (il you restore da plackei)os KT 1548 J ghierd da places for da plavios (gen flatias cf. Kt 1550 where Dapas. 3) (KT 1577 Kapvealas Euboryow autor the restoration by Dunnt Kap] vsa S[a]s - this probably Ev] Boy[00] is KT 1579 [05] should where percent 4/ KT 1650 bouk. Tuvádus Tludokpirov 5

DUOVIRI ARTICLE KNIDIAN (The two Men of Knidos)