

A Group of Stamped Hellenistic Storage-Jar Handles from Dor*

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I. THE JARS AND THEIR STAMPS

DURING the 1980 and 1981 seasons of excavation at Tel Dor (Kh. el-Burg) on the southern Phoenician coast,¹ 19 stamped storage-jar handles of a new type were excavated. They were registered together with 85 other stamped amphora handles (Rhodian, Knidian, Pamphylian[?] classes and unclassified) from those seasons. Subsequently the vessel of one of these stamped handles was completely restored (Fig. 1:1; Pl. 18:B). These stamped handles were distinguished from the other classes by their generally uniform ware, which is local in appearance, the profile of the jars which is typical of the 'Levantine' storage-jar,² the uniform size and rectangular shape of the stamp impressions, and especially the first three symbols (L $\bar{\text{B}}$) which are common to all of the impressions. On these bases, as well as their uniform stratigraphical disposition (see below, pp. 143–147), we may classify these handles as belonging to a new class of stamped standard pottery containers similar to, if not imitative of, well-known classes from the Greek world. This new class is termed the 'Dor group', the city of Dor being both its only find spot to date as well as its probable place of manufacture (see below, pp. 147–152).

* The excavations at Tel Dor are directed by E. Stern on behalf of the Institute of Archaeology of the Hebrew University, Jerusalem, and the Israel Exploration Society, with the participation of the Universities of Boston, New York and Sacramento. Our thanks to Prof. Stern for permission to publish this material and to Ayelet Gilboa for her assistance. The photographs were taken by Z. Radovan. Section I of the present article was contributed by D.T. Ariel, Section II by I. Sharon and Section III by J. Gunneweg and I. Perlman.

¹ Some recent publications on the excavations at Tel Dor and the nearby coast are A. Raban: Dor 1977, *RB* 85 (1978), pp. 410–411; idem, Some Archaeological Evidence for Ancient Maritime Activity at Dor, *Sefunim* 6 (1981), pp. 15–27; idem, Dor-Yam, 1982, *IEJ* 32 (1982), pp. 256–259; idem, Dor 1982, *International Journal of Nautical Archaeology* 12 (1983), pp. 229–241; A. Raban and M. Artzy: Dor Yam (Sea and Coastal Dor), *IEJ* 32 (1982), pp. 145–147; E. Stern: Excavations at Tel Dor 1981: Preliminary Report, *IEJ* 32 (1982), pp. 107–117; idem, Favissa of a Phoenician Sanctuary from Tel Dor, *Journal of Jewish Studies* 33 (1982), pp. 35–54; idem, Hellenistic Dor, *Bulletin of the Anglo-Israel Archaeological Society* 1 (1982), pp. 17–20; E. Stern and I. Sharon: Tel Dor, 1980, *IEJ* 30 (1980), pp. 209–213.

² I.e., the handles are attached to the body of the vessel at top and bottom; see A.G. Sagona: Levantine Storage Jars of the 13th to 4th century B.C., *Opuscula Atheniensia* 14 (1982), pp. 73–110.

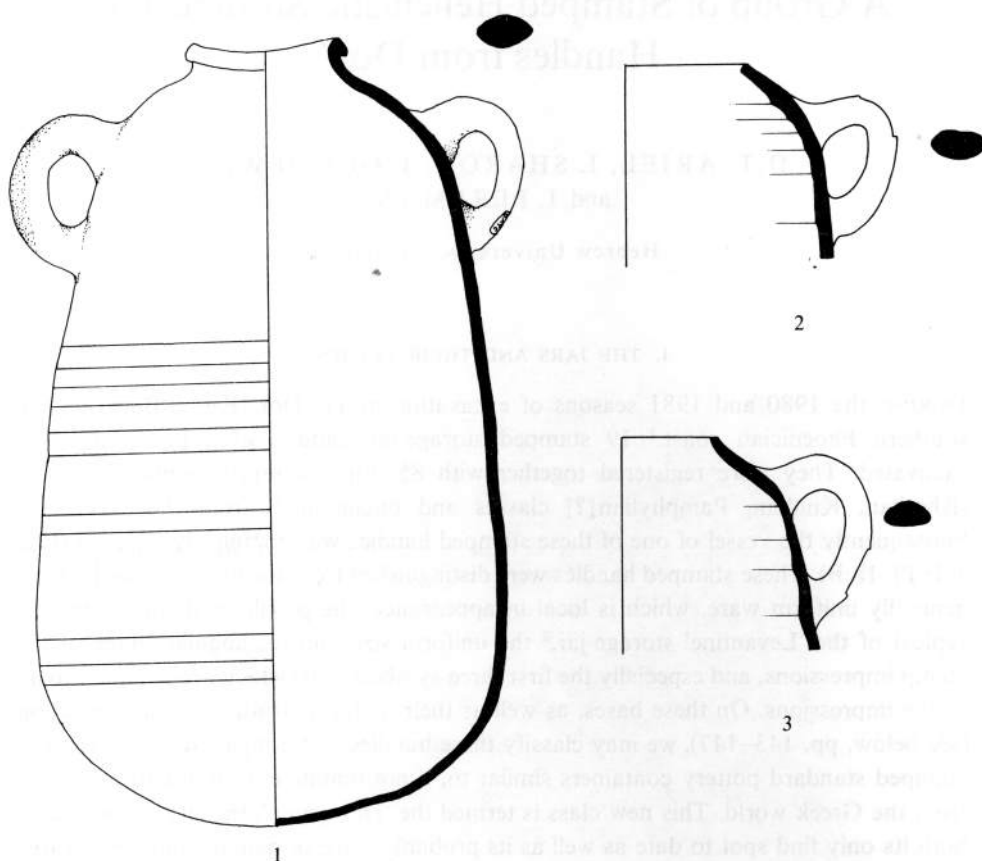


Fig. 1. Complete storage-jar and two handles. 1 – No. 10; 2 – No. 8; 3 – No. 12.

The Stamps

The handles were stamped with one of four dies, each bearing the symbols $L\bar{B}$ followed by one of four short Greek inscriptions and in many cases with additional symbols at the end (see Table 1). Nos. 1–7 read $L\bar{B}$ IACO (Fig. 2:1; Pl. 18:C). No. 8 reads $L\bar{B}$ $\Lambda\text{API}\omega$ (Fig. 2:2; Pl. 18:D). Nos. 9–13 read $L\bar{B}$ ΔTC (Fig. 2:3; Pl. 18:E). Nos. 14–19 read $L\bar{B}$ $C\omega\bar{K}$ (Fig. 2:4; Pl. 18:F). The stamps of IACO, $\Lambda\text{API}\omega$ and $C\omega\bar{K}$ are all located on the upper part of the handle near the join with the body of the vessel, the place on the handle most able to accommodate these relatively long impressions (3.9–4.2 cm.). Even there, one symbol or letter is not always impressed; because the stamps are impressed both on left and right handles, either the symbol L or a final symbol or letter is missing. In two occurrences of the longest impression (IACO) two letters are lacking. The one impression of $\Lambda\text{API}\omega$ was executed by ‘rolling’ the seal on the curved portion of the handle. The stamp of ΔTC is impressed only on the lower part

of the handle, which though it is generally less curved is also less well joined to the body, again causing faulty stamping.

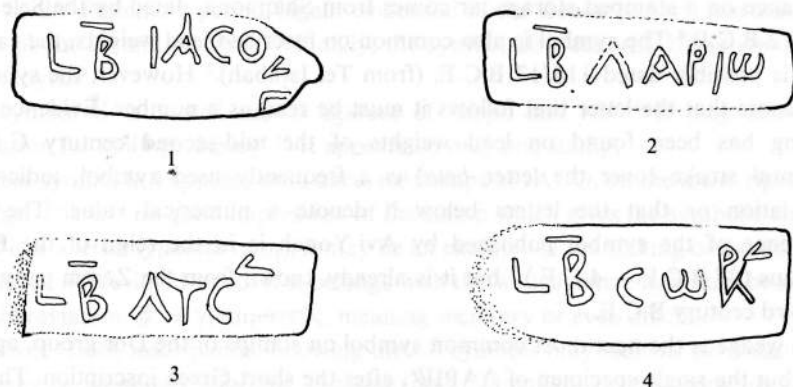


Fig. 2. The four types of impressions. The impressions were drawn on the basis of rubbings of all specimens.

Table 1. Stamped handles of the Dor group.

No.	Reading	Reg. No.	Locus	Phase	NAA No.
1	L̄B IA[CO₂]	4336	418	C₀ 4?/3?	
2	L̄B IACO₂	4896/1	564	C₀ 4	
3	L̄B IA[CO₂]	4986	564	C₀ 4	
4	L̄B IACO[₂]	40171/9	4045	C₀ 3	
5	L̄B IACO₂	40361/2	4075	C₀ 4	
6	L̄B IAC[O₂]	40584	4052	C₀ before 3	DOR 8
7	[L]B̄ IAC[O₂]	40591	4029	C₀ 2-4	
8	L̄B ΛAPIW	5032/1	564	C₀ 4	
9	[L]B̄ ATC[_Δ]	4435	479	C₀ 4	
10	[L]B̄ ATC[_Δ]	5330	611	C₀ 4	
11	L̄B ATC[_Δ]	40356	4075	C₀ 4	DOR 11
12	L̄B ATC[_Δ]	40571	4143	C₀ 4	
13	[L]B̄ ATC[_Δ]	40772	4092	C₀ 4	
14	L̄B C[W̄K̄ _Δ]	4976	564	C₀ 4	
15	[L]B̄ C[W̄K̄ _Δ]	40318	4051	C₀ 3?-4a?	DOR 9
16	L̄B CWK̄ _Δ	40387	4093	C₀ 4	
17	L̄B CW[K̄ _Δ]	40450	4083	C₀ 4(a)	
18	L̄B CW[K̄ _Δ]	40595	4029	C₀ 2-4	
19	L̄B CWK̄ _Δ	10171	1016	A 2/3	DOR 10

Five symbols appear on the stamps. L and a horizontal stroke over the letter *beta* appear on all four stamps. The occurrence of L as a symbol on Greek impressions is generally viewed as an Egyptian symbol for 'έτος (year).³ The symbol's earliest occurrence on a stamped storage-jar comes from Shiqmona, dated by the Seleucid era to 133/2 B.C.E.⁴ The symbol is also common on inscribed lead weights, the earliest of which is possibly dated 118/17 B.C.E. (from Tel Iştabah).⁵ However, the symbol can also denote that the letter that follows it must be read as a number. Evidence for this meaning has been found on lead weights of the mid-second century C.E.⁶ The horizontal stroke (over the letter *beta*) is a frequently used symbol, indicating an abbreviation or that the letters below it denote a numerical value. The earliest occurrence of the symbol published by Avi-Yonah is in the reign of the Emperor Augustus (27 B.C.E. – 4 C.E.),⁷ but it is already known from the Zenon papyri of the mid-third century B.C.E.

The wedge is the next most common symbol on stamps of the Dor group, appearing on all but the single specimen of ΛΑΠΙΩ, after the short Greek inscription. The wedge appears on the upper right on stamps of CωK and ΛTC and on the lower right on the stamp of IACO. The symbol looks like the letter *delta* with the right stroke missing. Wedges are symbols for the separation of two words in Greek inscriptions. They are found in many positions, often over the last letter of the first of two words being separated.⁸ But no second word appears on these stamps. Alternatively, the wedge in the same orientation as that appearing on the Dor group stamps is a symbol for different silver coin denominations.⁹ In papyri of the Hellenistic period the symbol had

³ M. Avi-Yonah: *Abbreviations in Greek Inscriptions. The Near East, 200 B.C. – A.D. 1100* (QDAP Supplement to Vol. 9), Jerusalem, 1940, p. 114. The earliest certain date according to Avi-Yonah is 299 B.C.E., but the symbol is actually common by 260 B.C.E., as it appears in many of the Zenon papyri. For its interpretation as έτος, see B.V. Head: *Historia Numorum: A Manual of Greek Numismatics*, Oxford, 1911, p. lxxxvi; Y.H. Landau: A Stamped Jar Handle from Jaffa, *Atiqot* (English Series) 2 (1959), p. 186. F.G. Kenyon: *Abbreviations and Symbols in Greek Papyri*, reprinted in A.N. Oikonomides: *Abbreviations in Greek Inscriptions: Papyri, Manuscripts and Early Printed Books*, Chicago, 1974, p. 130, notes one case of L being a sign for subtraction. See also A. Blanchard: *Sigles et abréviations dans les papyrus documentaires grecs. Recherches de paléographie*, London, 1974, p. 31, where a more curved version also means subtraction.

⁴ Y.H. Landau: Seal Impressions on Handles, in J. Elgavish: *Archaeological Excavations at Shikmona, Report No. 2, The Level of the Hellenistic Period — Stratum H, Seasons 1963–1970*, Haifa, 1974, p. 64 (Hebrew).

⁵ *Ibid.*, p. 186, n. 2b.

⁶ *Munz Zentrum Auktion 45, Gewichte aus drei Jahrtausenden*, 3, p. 39. Our thanks to S. Qedar for this information. O. Viedebant: Zur hebräischen, phönizischen und syrischen Gewichtskunde, *ZDPV* 45 (1922), pp. 12, 21 records an inscribed lead weight from Syria with the date and number both introduced by the symbol L which may date from 197 B.C.E. He viewed the phenomenon as a possible double date.

⁷ Avi-Yonah (above, n. 3), p. 35.

⁸ *Ibid.*, p. 38.

⁹ *Ibid.*, p. 114; Blanchard (above, n. 3), p. 32.

at least three additional meanings. It sometimes meant the letter *alpha* and, as a superscript, the next letter in an abbreviated word.¹⁰ The symbol was also an acrophonic abbreviation for *artab* (ἄρτάβη),¹¹ a measure of capacity used in Palestine at least in the Ptolemaic period (again evidenced in the Zenon papyri) and measuring between about 25 and 45 litres.¹² Finally, the symbol also denoted 1/2 in some of the Zenon papyri.¹³

The symbol $\bar{\kappa}$ is a well-known ligature of *kappa* and *rho*.¹⁴ It may also be an abbreviation for κρι(θη), 'barley'.¹⁵ It appears on only one stamp.

The last symbol (ρ) appears only once, on stamps of IACO, on the lower right below the wedge. There is no good impression of the stamp which gives the symbol's complete form. If it is a letter (*gamma* or *pi*), it may be an example of the sinking of the final letter of a word or abbreviated word. If it belongs with the wedge above it, it may be restored as the abbreviation $\bar{\rho}$ = γραμματεὺς, meaning secretary or even official.¹⁶

The short Greek inscriptions following the $\bar{\kappa}$ symbols may indicate personal names. IACO may be an abbreviation for Ἰάσονος (nom. Ἰάσων) or the less common Ἰάσοος (nom. Ἰάσω). $\text{C}\omega\bar{\kappa}$ may be an abbreviation for Σωκράτεως (nom. Σοκράτης); in that case the wedge could be a superscript *alpha*. Alternatively it could be an abbreviation for that or some other personal name beginning Σω..., and the symbol $\bar{\kappa}$ could mean κρι(θη), 'barley'. In that case, the wedge might mean (one) *artab* or even 1/2 (of some volume). The two other short Greek inscriptions defy decipherment as abbreviations for words or personal names. However, considering the likelihood that IACO and $\text{C}\omega(\bar{\kappa})$ are abbreviations for personal names, the other two may be the same. If the sunken symbols after IACO are restored as γραμματεὺς, we could view the persons named as

¹⁰ Blanchard (above, n. 3), p. 4; F.W.G. Foat: Sematography of the Greek Papyri, *Journal of Hellenistic Studies* 22 (1902), p. 143.

¹¹ Blanchard (above, n. 3), p. 51; Foat (above, n. 10), p. 155. Many symbols for this word developed; see Blanchard (above, n. 3), pp. 51–58.

¹² The metrology of this measure of capacity is disputed. See A. Oxé: Kor und Kab. Antike Hohlmasse und Gewichte in neuer Beleuchtung, *Bonner Jahrbücher* 147 (1949), pp. 91–216; A. Segré: A Documentary Analysis of Ancient Palestinian Units of Measure, *Journal of Biblical Literature* 64 (1954), pp. 357–367; R.P. Duncan-Jones: The Choenix, the Artabe and the Modius, *Zeitschrift für Papyrologie und Epigraphie* (ZPE) 21 (1976), pp. 43–52; and most recently J. Shelton: Two Notes on the Artab, *ZPE* 42 (1981), pp. 99–106, with bibliography of recent literature. Nevertheless, there is agreement that a number of different measures are implied by the one term. Our thanks to A. Eran for his assistance with regard to these metrological questions. Incidentally, Josephus quotes the term *artab* in a letter of Antiochus III dating some time after 198 B.C.E. (*Ant.* 12, 140).

¹³ E.g. C.C. Edgar: *Zenon Papyri in the University of Michigan Collection*, Ann Arbor, 1931, p. 96; Foat (above, n. 10), pp. 146–147.

¹⁴ Avi-Yonah (above, n. 3), p. 75. Stamped handles apparently from Jaffa are also known to bear ligatures of Greek letters. See E. Stern: *Material Culture of the Land of the Bible in the Persian Period 538–332 B.C.*, Jerusalem, 1982, p. 198.

¹⁵ Blanchard (above, n. 3), p. 47, No. 36.

¹⁶ *Ibid.*, p. 6.

local officials.¹⁷ In that case the two other superscript wedge symbols would signify the contents of the storage-jar.

One problem with these identifications is the fact that the symbols do not appear on all stamps. Why does the wedge, possibly meaning *drachm*, *artab* or 1/2, appear on two (or three) of four stamps? Why do the symbols possibly meaning barley or γραμματεὺς appear on only one stamp each? Moreover, if the wedge symbol designates a certain volume or price, where is the numeral? Conversely, if the wedge symbol stands for 1/2, what is being measured? The discovery of more stamp types (or a better preserved stamp with the ⚡ symbol)¹⁸ would certainly add weight to one identification or another.

The Type

Only one complete vessel of the Dor group, No. 10, was found (Fig. 1:1; Pl. 18:B). Its volume, measured by filling the vessel with polyurethane balls, is 25.4 litres. Profiles of large fragments of other jars with stamped handles (Fig. 1:2–3) show that the shapes of all the storage-jars of the Dor group were probably quite similar.¹⁸ Their ware is a quite uniform buff with few or no inclusions.¹⁹ From its shape the type is certainly Palestinian, described as a bag-shaped jar by Lapp.²⁰ The type is more characteristic of the north and is certainly found earlier than the *terminus* for Lapp's study (200 B.C.E.), appearing as early as the Persian period.²¹ As for the shape of the rim, most parallels are no later than the third century B.C.E.,²² but a few examples occur as late as the second half of the second century B.C.E.²³

¹⁷ An ἄγορανόμος is described as γραμματεὺς on a weight; *Munz Zentrum Auktion 37, Gewichte aus drei Jahrtausenden*, 2, p. 33. However, the fact that all four names appear in one year makes this interpretation somewhat unlikely. For an alternative suggestion of the meaning of the names, see p. 143.

¹⁸ The scale of the profiles is 1:10; that of the stamps is 1:1.

¹⁹ One exception is No. 1, whose ware is redder and whose profile is more angular. The handle is also the poorest stamped of the group.

²⁰ P.W. Lapp: *Palestinian Ceramic Chronology 200 B.C. – A.D. 70*, New Haven, 1961, pp. 148–149. More recent examples of the vessel type are found in M. Dothan and D.N. Freedman: *Ashdod I: The First Season of Excavations 1962*, *Atiqot* (English Series) 7 (1967), p. 25, Fig. 7:9; M. Dothan: *Ashdod II–III: The Second and Third Seasons of Excavations 1963, 1965; Soundings in 1967*, *Atiqot* (English Series) 9–10 (1971), p. 49; III, Fig. 12:2; Z. Yeivin and G. Edelstein: Excavations at Tirat Yehuda, *Atiqot* (Hebrew Series) 6 (1970), p. 58, Fig. 6:5; Elgavish (above, n. 4), p. 56, Pls. X:212, XXVII:268; J. Briand: *Vestiges hellénistiques*, in J. Briand and J.-B. Humbert: *Tell Keisan (1971–1976)*, Paris, 1980, p. 105, Pls. 8:4, 6, 7.

²¹ E.g. Stern (above, n. 14), p. 104, Type F.

²² The rim appears closest to what S. Gitin: *A Ceramic Typology of the Late Iron II, Persian and Hellenistic Periods at Tell Gezer*, unpublished doctoral dissertation, Cincinnati, 1979, II, p. 57 describes as a slightly everted rim with overhang flange (Pl. 29:3). The Gezer type is of the Persian period; see W.G. Dever *et al.*: *Gezer I: Preliminary Report of the 1964–66 Seasons*, Jerusalem, 1970, Pl. 33:4. See also similar rims in F. Zayadine: *Early Hellenistic Pottery from the Theatre Excavations at Samaria*, *ADAJ* 11 (1966), p. 56, No. 9, p. 27:9 (first half of the third century B.C.E.); N.R. Lapp: *Pottery from Some Hellenistic Loci at Balâṭah (Shechem)*, *BASOR* 175 (1964), p. 17, Fig. 2:2 (c. 225–190 B.C.E.); J.L. Kelso: *The Excavation of Bethel (1934–1960)*, *AASOR* 39 (1968), Pl. 69:4 (up to 160 B.C.E.).

²³ Briand (above, n. 20), p. 105, Pl. 8:7, dating until 150–130 B.C.E. (p. 113); Lapp (above, n. 22), p. 148, rim f (150–100 B.C.E., from Shechem).

The Date

The dating of the Dor group storage-jars is based on both internal and external evidence. The external, stratigraphical evidence is summarized below (pp. 144–147). There a date for the finds certainly in the second century B.C.E., and probably between the years 175 and 130 B.C.E., is proposed.

Typologically the group's range is great, beginning in the late Persian period, spanning the first half of the Hellenistic period and continuing to 100 B.C.E., even considering its early type of overhanging flange rim. In the excavations at Dor, the unstamped type is the most dominant of the storage-jars of its period.²⁴ The latest date for parallels from nearby Tell Keisan is 150–130 B.C.E., similar to the date for the Dor group arrived at from local stratigraphical considerations.

The possible chronological evidence is the most tantalizing, if unfortunately the most inconclusive. If the LB on the stamps refers to year two, we must consider to what era it may have belonged, bearing in mind that with such a low number the possibilities are numerous. The first possibility is the era of Dor itself, which is the Pompeian era beginning in 64/3 B.C.E.²⁵ The resulting date, 63/2 B.C.E., is most probably too late for the typological and stratigraphical evidence already noted. At the other end of the spectrum, the eras of the Seleucid and Ptolemaic rulers (312/11 and 311/10 B.C.E.) would certainly place year two too early for the date derived from other evidence. Turning to eras beginning in the second century B.C.E., those of Tyre (126/5) and Sidon (112/11) are more in keeping with the other dating criteria. Of the two, the era of Tyre would be preferable, though Dor traditionally had closer relations with Sidon.²⁶ By the second century, the Ptolemies had turned to dating by regnal years.²⁷ However, there is no evidence for Dor being in Ptolemaic hands for even two years in the second century B.C.E. The Ptolemaic practice of dating by regnal years was adopted in exceptional instances on Seleucid coins, e.g. under Tryphon, whose coins bear the dates LB, LF, and LA.²⁸ At about the same time, the period of the Maccabean rulers

²⁴ My thanks to Bracha Guz-Zilberstein, who is currently working on the Hellenistic pottery from Dor, for this information.

²⁵ E. Schürer: *The History of the Jewish People in the Age of Jesus Christ, 175 B.C. – A.D. 135*, rev. G. Vermes and F. Miller, II, Edinburgh, 1979, p. 120, n. 185.

²⁶ *Ibid.*, p. 119. This closeness with Sidon rather than Tyre is clearly manifested in the numismatic finds at Dor as well.

²⁷ A coin of Ptolemy VII minted at 'Akko-Ptolemais, probably in 148 B.C.E., bears the L symbol and regnal year; J.N. Svoronos: *Tā νομίσματα τοῦ κράτους τῶν Πτολεμαίων*, II, Athens, 1904, No. 1486.

²⁸ E. Babelon: *Les rois de Syrie, d'Arménie et de Commagène*, Paris, 1890, p. cxxxviii. S. Qedar reports that the year LA has recently been identified on a coin of Tryphon. The second instance of a regnal date on a Seleucid coin is published by Y. Meshorer: *The Beginning of Hasmonean Coinage*, *IEJ* 24 (1974), pp. 59–61, a coin of Antiochus VIII with an era of 125/4 B.C.E. or 121 B.C.E. In spite of disagreement about the mint and importance of the coin, its use of a regnal era is accepted.

commenced,²⁹ yet another era to be considered. We must also note the possibility of a short-lived era which is unattested in the historical sources.

Three published stamped handles from Shiqmona, Jaffa and H. Sharati have dates according to the Seleucid era of 133/2, 130/29 and 128/7 B.C.E. respectively, falling between the era of Tryphon and the era of Tyre.³⁰ The fact that Tryphon's reign was cut short may perhaps explain the occurrence of only one year on the stamps. We know of Tryphon's close relationship with Dor, to which he escaped with the advance of Antiochus VII Sidetes in approximately 139 B.C.E.³¹

The Function of the Stamps

There remains to be considered the purpose of the stamps on the handles of these storage-jars. Two traditions of stamping handles of storage-jars may have induced the potters of Dor to adopt the practice, one tradition Palestinian and one originating in the Greek world. The tradition of stamping storage-jars and other pottery containers was deeply rooted in Canaan from early periods.³² Large classes of stamped storage-jars have been identified from the Iron Age II, Persian and Hellenistic periods in Judea. The storage-jars stamped with *yhd-ṭ* and *yršlm*³³ were probably contemporary with the Dor group, which was much more limited in quantity and distribution. Also contemporary with the group were the many large classes of stamped amphoras originating in Rhodes, Knidos and elsewhere and distributed throughout the Mediterranean basin.³⁴ Small classes like the Dor group have recently been isolated and published.³⁵

²⁹ Schürer (above, n. 25), I, Edinburgh, 1973, p. 190. Dating according to this era is evidenced once or twice: in year 3 (1 Macc. 14:27–45) and in year 9. The dating of this second document has been challenged by M. Stern: *The Documents on the History of the Hasmonean Revolt with a Commentary and Introductions*, Tel Aviv, 1965, p. 159 (Hebrew).

³⁰ Landau (above, n. 3), pp. 186–187; Landau (above, n. 4), p. 64. The few stamped handles with letter dates outside Palestine are discussed by V.R. Grace and M. Savvatanou-Pétropoulakou: *Les timbres amphoriques grecs*, in P. Bruneau et al.: *L'Îlot de la Maison des Comédiens*, Paris, 1970, p. 307. The symbol L appears only on dated stamps of the Koan class.

³¹ Schürer (above, n. 25), II, p. 119. The attribution of coins of Tryphon to Dor is no longer accepted (p. 129, n. 183). Incidentally, two tetradrachms of year four of Tryphon were found in the excavations there. Most interesting for the archaeological connection between Dor and Tryphon is the sling bullet manufactured and found at Dor, which mentions Tryphon and is dated, using the L symbol, to year 5; see below, pp. 153–163. This find adds weight to an identification of the era on the stamped handles as Tryphon's. It also apparently extends the date of Antiochus VII's advance on Dor into 138/7 B.C.E. The paleographical differences between the script of the jar inscriptions and that of the sling bullet are noteworthy.

³² V.R. Grace: *The Canaanite Jar*, in S.S. Weinberg (ed.): *The Aegean and the Near East: Studies Presented to Hetty Goldman on the Occasion of her Seventy-fifth Birthday*, Locust Valley, New York, 1956, pp. 80–109.

³³ N. Avigad: *More Evidence on the Judean Post-Exilic Stamps*, *IEJ* 24 (1974), pp. 57–58; idem, *Bullae and Seals from a Post-Exilic Judean Archive*, Jerusalem, 1976, p. 27.

³⁴ V.R. Grace: *Amphoras and Ancient Wine Trade*, Princeton, 1979.

³⁵ E.g. V.R. Grace: *Kouriaka*, in V. Karageorghis et al. (eds.): *Studies Presented in Memory of P. Dikaios*, Nicosia, 1979, pp. 178–188; V.R. Grace and J.-Y. Empereur: *Un groupe d'amphores*

If only for the reason of its Greek inscription, the Dor group appears to belong to the Greek tradition of stamping storage containers. None of the Judean classes employ dates (using letters or eponyms), as is common in the Greek types. The Greek and possibly also the Judean traditions do however contain what are apparently names of potters.³⁶ This may be an alternative identification of the names on the inscriptions of the Dor group. The date and suggested identification of the names on the stamps of the Dor group storage-jars do not answer the question of the stamps' function, but it would seem that their function was similar to that of stamps on amphoras of Greek origin, as a guarantee of capacity.³⁷ *

II. THE STRATIGRAPHICAL CONTEXT OF THE JARS

The following is a short description of the Hellenistic strata of Tel Dor with special reference to Area C, in which all but one of the Dor group handles were found. The analysis of the stratigraphy of the site is in an early stage, and these remarks must therefore be considered as preliminary. Both the known history of Dor and the archaeological evidence indicate an almost uninterrupted occupation from some time in the Persian period until well into the Roman era.

Final numbers for the excavated strata have not yet been assigned. Nevertheless, the relative stratigraphical sequence can reasonably be established, at least within each architectural unit. Between units the sequences are often disjointed. Each of the three excavated areas (A, B, and C) has therefore been divided into sub-areas according to architectural units, and a separate stratigraphical sequence has been worked out for each sub-area.

Two urban elements exist in all three areas and serve as markers with which the separate sequences may be correlated. These are the city's eastern fortification line and a street running parallel to it ('Street I' in Fig. 3). At an as yet undetermined date in the latter part of the Persian period, the fortified stratum was destroyed and the city was subsequently rebuilt without fortifications. Remains of this phase have been found in Areas B and C between the Persian and Hellenistic fortifications. In many places, this intermediate phase can be divided into two sub-phases. In all such cases, the lower floor-levels were of the Persian period, while the upper were undoubtedly Hellenistic.

The importance of Dor as one of the independent city-states along the coast grew during the third century B.C.E., and the city soon merited extensive fortification. A 2.5 m. thick ashlar wall with square towers was built along the line of earlier city-walls.

Ptolémaïques estampillées, *Bulletin du Centenaire (supplément au Bulletin de l'institut français d'archéologie orientale du Caire)*, Cairo, 1981, pp. 409–426.

³⁶ F.M. Cross, Jr.: Judean Stamps, *EI* 9 (1969), p. 24*.

³⁷ V.R. Grace: Standard Pottery Containers of the Ancient Greek World, *Hesperia Supplement* 8 (1949), pp. 175–189. If the LB symbols do not refer to year two, they may refer to the volume of the storage-jar.

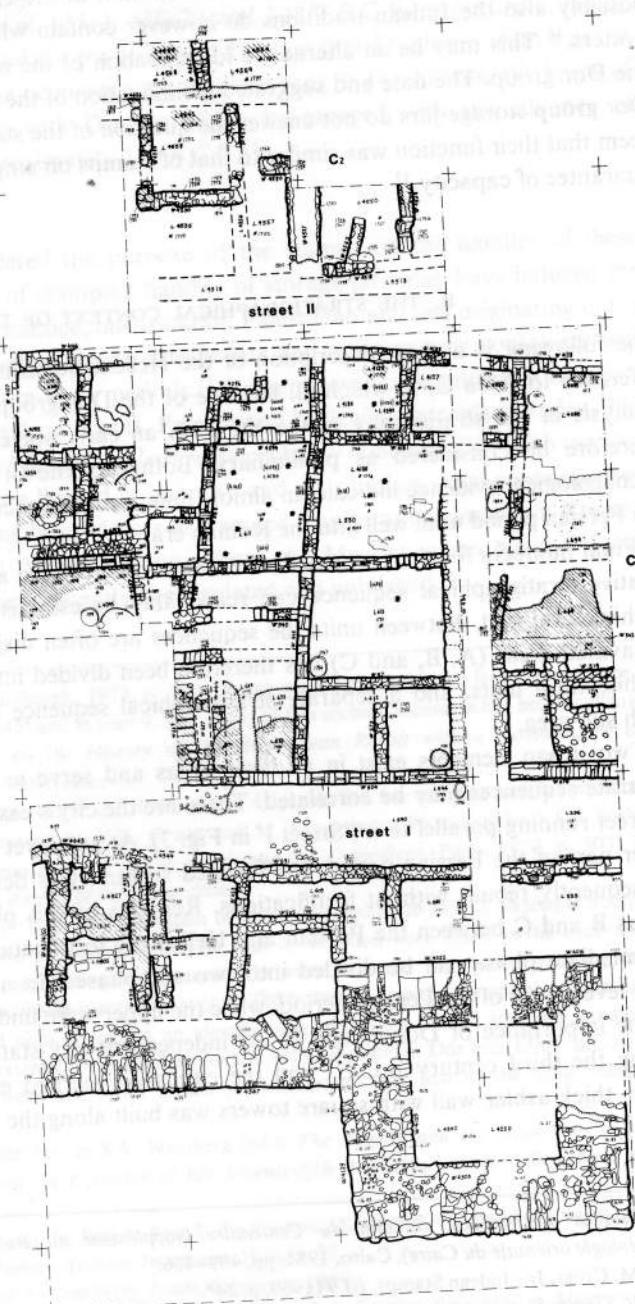


Fig. 3. Plan of Area C in the Hellenistic period.

A *terminus ante quem* for the building of this wall is given by Polybius, who records that the campaign of 219 B.C.E. in the fourth Syrian war between Antiochus III and Ptolemy IV ended after a futile siege of the heavily fortified city of Dor.³⁸ The latest coins in the previous stratum belong to Ptolemy II. The city-wall was therefore built at the end of his reign, during the reign of Ptolemy III or even in the first years of Ptolemy IV's reign.

Two superimposed strata relate to the Hellenistic city-wall in all three areas, the second being essentially a rebuilding of the first and usually of inferior workmanship. Whereas artifacts from the lower stratum date roughly from the second century B.C.E., those from the upper stratum span the first century B.C.E. and first century C.E. The construction of the upper stratum may be associated with one of two historical events: the activities of Alexander Jannaeus or the city's restoration under Pompey (64 B.C.E.).³⁹ However, it may date even later.

Let us now look at the sequence in Sub-area C₀, the *insula* between Street I and Street II on Fig. 3. Phase 5 has so far appeared in Area C in only a few places. A series of walls constructed in the Phoenician ashlar pier technique, often serving as the foundation of Phase 4 walls, was excavated. The date of the end of Phase 5 is later than 250 B.C.E. The building of Phase 4 may generally be correlated with the erection of the city-wall, and must therefore date before 219 B.C.E. No gap between Phases 5 and 4 has been discerned. Phase 4 consists of well-preserved residences. The façade of Street I is built in header-stretcher style, while most of the interior walls and the side facing Street II are built using the ashlar pier technique. In some rooms in Sub-area C₀, two separate floors were uncovered, labelled 4a and 4b respectively; in other rooms only one floor-level was found. The following Phase 3 suffered from erosion and considerable stone robbing. Its walls partly reused and partly cut into the previous phase; these walls are of poorer workmanship than the previous Phase 4 construction and the later Roman walls (Phase 2), which are made of cement or single lines of square ashlar. The latest well-dated artifacts from Phase 4 in Sub-area C₀ can be dated within the second century B.C.E. (though some have a range which continues into the first century B.C.E.). The earliest artifacts positively ascribed to Phase 3 belong to the period of Herod the Great (40 [37]–4 B.C.E.), raising the possibility of an approximately sixty-year gap in occupation. However, because Phase 3 seems to be merely a renovation of the Phase 4 house and many of the Phase 4 walls were still standing when Phase 3 was built, these sixty years were probably a period of decline when this part of the city was only sparsely populated.

The Context of the Stamped Handles

Loci 564, 611, 4075, 4092, 4093, 4123, 4134, 4143. These contiguous loci, all in two

³⁸ G. Dahl: The Materials for the History of Dor, *Transactions of the Yale Academy of Arts and Sciences* 20 (1915), p. 65.

³⁹ *Ibid.*, pp. 74–76.

rooms in the south-western corner of Area C, yielded the greatest concentration of Dor group storage-jar handles, as well as the one complete storage-jar. Three stratigraphical distinctions were made in the debris upon the floors of these two rooms. Upon a beaten earth floor, a group of storage-jars (including the stamped jar) and a fish plate were found broken but *in situ* (Pl. 18:A) in a layer (Loci 611, 4123, 4134, 4143) consisting of soft, grey, ashy material, and a great deal of fallen masonry. Above the grey layer is a layer (Loci 564, 4075, 4092, 4093) of more compact, yellowish material with a large amount of restorable pottery (including a Rhodian amphora). Our first impulse was to assign the upper yellowish layer to Phase 4a and the lower grey layer and vessels on the floor to Phase 4b. However, the dividing line between the two layers is extremely uneven, and connections existed between restorable vessels of the lower and upper layers. Moreover, the artifacts from both are of comparable date, showing that only one living phase exists in these rooms. The lower grey layer is destruction debris on top of the floor and the yellow layer may be the result of levelling operations prior to the construction of Phase 3.

Other loci. Loci 418, 479 and 4051 are fills probably dating from Phase 4 but disturbed by later intrusions. Locus 4083 is a Phase 4a fill above the uppermost of two Phase 4 floors. Wall 4052 is a rubble wall of Phase 3; the handle found in dismantling this wall predates its construction. Wall 4029 has a construction and a rebuild phase; the two handles from this context were found in the rebuild phase (Phase 2) and therefore predate it (Phase 3 was completely absent in that spot). The stamped handle from Locus 4045 comes from a fill above the Phase 3 floor which sealed the loci containing the concentration of Dor group handles. In view of the abundance of handles below this floor, it is not surprising that one found its way to a constructional fill above it. Finally, the stamped handle from Locus 1016 in Area A was found inside one of the towers in the Hellenistic wall in a stratigraphically doubtful context.

Dating

Phase 4 in Area C was most probably built between 250 and 200 B.C.E. or slightly later. The uncertain date of the end of the Phase 4 occupation (*c.* 100 B.C.E.) depends on the question of a gap between it and the construction of Phase 3. Most of the stamped handles of the Dor group were found in Phase 4 contexts. In Table 2 are listed all the well-dated artifacts from the group of contiguous loci containing most of the handles.⁴⁰ It will be seen that these loci have a narrower range than the maximal dates proposed above. If we discount one Rhodian handle whose date is uncertain and the coin of Alexander the Great which is obviously out of context, then the minimal range of all the artifacts is *c.* 175 – *c.* 130 B.C.E. A date within this range for the Dor group is likely. The fact that a stamped jar of this group was lying on the floor of a room when the house was destroyed points to a date towards the end of this period.

⁴⁰ The coins and Rhodian stamped handles were identified by D.T. Ariel and the oil lamps were dated by Renate Higenbottom-Rosenthal.

Table 2. Well-dated artifacts from the contiguous loci in which most of the Dor group handles were found.

Reg. No.	Locus	Object	Date
40687	4143	Coin	336-323 B.C.E.
5022	564	Rhodian handle	210-175 B.C.E.
40394	4092	Rhodian handle	c. 190-175 B.C.E.
40445	4092	Rhodian handle	c. 183-175 B.C.E. or 108-80 B.C.E.
5167	611	Rhodian handle	c. 183-146 B.C.E.
5142	611	Rhodian handle	175-146 B.C.E.
4937	564	Rhodian handle	175-146 B.C.E.
4989	564	Rhodian handle	175-146 (-108?) B.C.E.
4981	564	Oil lamp	150-37 B.C.E.
5000	564	Oil lamp	150-37 B.C.E.
40615	4093	Coin	Before 132 B.C.E.
40498	4123	Coin	Before 132 B.C.E.
40516	4123	Coin	Before 132 B.C.E.

III. THE PROVENIENCE OF THE JARS

The analytical technique that has proved to be best adapted for judging the provenience of vessels by means of their chemical compositions is neutron activation analysis (NAA) and the application has been aptly named 'chemical fingerprinting'. Pottery vessels are products of earthy materials (clays) which contain all the elements found in nature. On a weight basis only nine elements account for more than 99% of a clay, and only six of these can be measured with some degree of accuracy. The remainder of the many elements found in nature are present only in the parts-per-million range. The sensitivity for distinguishing between sources depends upon the measurement of a considerable array of elements, and these, of necessity, must comprise mainly trace elements. The special virtue of NAA is that it can measure many of these with remarkable accuracy.

The chemical composition of a vessel cannot in itself establish where the vessel was made. For this one must find a match with the composition of reference material from a site which is eligible as the source of the vessel. Clays themselves can be used as reference material, but generally one must use pottery collected from that site. The reference material for the present study will be discussed below.

Results

Most provenience studies begin with an exploratory probe consisting of the analysis of relatively few vessels. In the present study, the preliminary objective was to see if members of the Dor group stamped jar handles have similar compositions and if the compositions bear any resemblance to those of reference materials which are already in

our data banks. Consequently, no particular effort was made to collect and analyse reference material from Dor itself.

As will be seen, the preliminary results gave satisfactory answers to the main question and, of practical importance, they indicated that further work would probably not provide additional insight unless a large programme of analysis were undertaken.

Four Dor group stamped jars were analysed, three of which (DOR 9, 10, 11) were closely similar in composition. The fourth jar (DOR 8) did not provide a good match with this small group of three, but the similarity in the pattern of the elements was unmistakable.

The first data column in Table 3 pertains to the chemical profile of the group of three jars. The composition for each element is given by paired numbers symbolized by M and σ , where M is the mean value for the group and σ is an index for the spread of values among the three jars. The combination $M \pm \sigma$ has statistical significance which will not be dealt with in this report.

Table 3. Dor group jars.

Element*	DOR 9, 10, 11 3 vessels	DOR 8 1 vessel	DOR 8 x 0.86
Ca %	18.9 \pm 0.9	12.1	—
Ce	33.7 \pm 1.2	38.2	32.8
Co	9.20 \pm 0.61	9.35	8.05
Cr	62 \pm 2	82	71
Cs	1.13 \pm 0.46	1.75	1.47
Eu	0.68 \pm 0.02	0.78	0.67
Fe %	2.57 \pm 0.21	2.74	2.40
Hf	3.39 \pm 0.09	4.21	3.62
La	16.7 \pm 0.4	18.9	16.3
Lu	0.20 \pm 0.02	0.23	0.20
Na %	0.40 \pm 0.19	0.16	0.15
Sm	2.81 \pm 0.10	3.23	2.78
Sc	9.70 \pm 0.49	11.30	9.72
Ta	0.54 \pm 0.02	0.71	0.61
Th	4.45 \pm 0.35	5.36	4.61
Ti %	0.18 \pm 0.04	0.20	0.17
U	1.22 \pm 0.05	1.42	1.22
Yb	1.31 \pm 0.06	1.61	1.38

* All elements are in parts-per-million except those with % sign.

Before examining the relation between DOR 8 and the group of three, it is necessary to point out an important feature of these wares. The amount of the element calcium (Ca) found in clay minerals is normally only one or two per cent; consequently the value of 18.9% indicates pottery clay which has a large admixture of fine chalky calcite (CaCO_3). The use of such calcareous clays in pottery-making is not common, but in

some regions the ancient pottery is exclusively of this kind. This is the case for sites in the northern coastal region of Israel extending into Lebanon. This observation does not prove that the Dor group jars were made in this region; however, if they did not have high calcium values, it would be highly unlikely that they were made there.

This clue for provenience is a mixed blessing, for the high calcium value makes it more difficult to establish provenience on a site-by-site basis. In clays where the amount of calcite is high, it is also quite variable. One may ignore the calcium values in comparing pottery compositions if the amount of calcium does not affect the abundances of the other elements which are used for fingerprinting. An example will illustrate how calcium has such an effect.

Calcite weighs $2\frac{1}{2}$ times as much as its calcium component; therefore a vessel containing 20% calcium was made from clay with 50% calcite. Since the elements used for fingerprinting are almost exclusively in the clay minerals, their abundances are strongly depressed by the dilution of the clay component by calcite. If the amount of calcite is variable, so are the dilution factors. It is not possible to calculate the amount of dilution from the calcium alone because, depending on the kiln temperature, varying amounts of calcite decompose with the emission of carbon dioxide. The test for a dilution effect is that a single arithmetic factor applied to one group, or piece of pottery, will bring all of the diverse elements into line with another group.

DOR 8 was also made from a calcareous clay, but not as calcareous as the clays of the vessels in Column 1. In comparing the data of these two columns, it will be seen that DOR 8 is higher in almost every element.

The third column shows what happens to the abundances of DOR 8 when each value, other than that of calcium, is multiplied by 0.86. One now sees that DOR 8 has been brought much better in line with the vessels in Column 1. It can be shown more rigorously that all four of these stamped jars belong together chemically. Other publications provide a detailed discussion of how to deal with dilution effects in provenience studies.⁴¹

As mentioned above, it was decided not to analyse large quantities of pottery from Dor which could serve as reference material. However, three vessels were analysed which could reasonably serve this purpose.

One of these vessels, DOR 4, was a Hellenistic bowl. The other two (DOR 3 and 5) were storage-jars which were typologically different from the stamped jars. All were very similar to one another in composition, so the data were grouped with the results shown in the second column of Table 4. The first column repeats the data for the stamped handles.

⁴¹ A study of dilution factors applied to Western Sigillata may be found in F. Widemann *et al.*: A Lyons Branch of the Pottery-Making Firm of Ateius of Arezzo, *Archaeometry* 17 (1975), pp. 50–57, Table V. For a similar study of pottery from Ashdod, see I. Perlman and F. Asaro: Provenience Studies on Pottery of Strata 11 and 10, in M. Dothan: *Ashdod IV, Excavation of Area M, Atiqot* (English Series) 15 (1982), pp. 75–78, Table 2.

Table 4. Dor group jars and Dor reference pottery.

Element	Dor group DOR 9, 10, 11	Reference group DOR 3, 4, 5	Reference group x 0.79
	M \pm σ	M \pm σ	
Ca %	18.9 \pm 0.9	14.4 \pm 0.9	
Ce	33.7 \pm 1.2	43.3 \pm 0.7	34.2 \pm 0.6
Co	9.20 \pm 0.61	11.93 \pm 0.94	9.42 \pm 0.74
Cr	62 \pm 2	78 \pm 5	62 \pm 4
Cs	1.13 \pm 0.46	1.57 \pm 0.36	1.24 \pm 0.28
Eu	0.68 \pm 0.02	0.91 \pm 0.03	0.72 \pm 0.02
Fe %	2.57 \pm 0.21	3.01 \pm 0.05	2.38 \pm 0.04
Hf	3.39 \pm 0.09	4.15 \pm 0.41	3.28 \pm 0.04
La	16.7 \pm 0.4	20.7 \pm 0.5	16.3 \pm 0.3
Lu	0.20 \pm 0.02	0.28 \pm 0.04	0.22 \pm 0.02
Na %	0.40 \pm 0.19	0.39 \pm 0.05	0.31 \pm 0.04
Sm	2.81 \pm 0.10	3.76 \pm 0.04	2.97 \pm 0.03
Sc	9.70 \pm 0.49	10.97 \pm 0.39	8.67 \pm 0.31
Ta	0.54 \pm 0.02	0.72 \pm 0.02	0.57 \pm 0.02
Th	4.45 \pm 0.35	5.42 \pm 0.15	4.28 \pm 0.12
Ti %	0.18 \pm 0.04	0.24 \pm 0.05	0.19 \pm 0.04
U	1.22 \pm 0.05	1.51 \pm 0.11	1.19 \pm 0.09
Yb	1.31 \pm 0.06	1.78 \pm 0.14	1.41 \pm 0.11

Again it is seen that the data for DOR 3-5 are systematically higher than those of the stamped jars. Column 3 shows the results of applying an arithmetical factor to the elements for the DOR 3-5 group. Comparison of the data in Column 3 with those in Column 1 shows that they are virtually identical.

The above discussion dealt with only seven vessels, all of which were excavated at Dor and probably made there. Complications which arise when the pottery of interest is highly calcareous were also mentioned. However, the discussion provided no perspective on variations of composition which are encountered in pottery from different places.

The first column in Table 5 repeats the data for the stamped jar group: next to it are the data for a group of 21 vessels from Tel Megadim, which lies only about 17 km. north of Tel Dor. This group is related to the stamped jars of Column 1 in much the same way as DOR 8 is (see Table 3); in fact, DOR 8 could be a member of the Megadim chemical group. This does not mean that the stamped jar DOR 8 was made at Megadim, nor that the Megadim vessels came from Dor. At Tel Megadim only the Persian period is attested, and pottery made there cannot be as late in date as the stamped jars. The results from the Megadim material do indicate that clays from there are closely similar to clays that were used for the Dor wares.

Further north, at 'Akko, the pottery was also calcareous but in other respects very different from the Dor material. South of Dor, at Tel Mevorakh, the pottery was again calcareous but none of the other elements provided a match.

Table 5. Dor group. Megadim, Ashdod, Knidian jars.

Element	Dor group DOR 9, 10, 11 M \pm σ	Megadim 21 vessels M \pm σ	Ashdod 20 vessels M \pm σ	Knidian jars 2 vessels M
Ca %	18.9 \pm 0.9	10.6 \pm 1.9	5.0 \pm 0.9	3.7
Ce	33.7 \pm 1.2	37.7 \pm 3.2	65.8 \pm 3.0	90.7
Co	9.20 \pm 0.61	9.53 \pm 1.05	19.26 \pm 1.05	28.95
Cr	62 \pm 2	74 \pm 7	118 \pm 7	340
Cs	1.13 \pm 0.46	1.40 \pm 0.32	1.74 \pm 0.40	13.14
Eu	0.68 \pm 0.02	0.88 \pm 0.06	1.46 \pm 0.07	1.21
Fe %	2.57 \pm 0.21	2.86 \pm 0.16	4.28 \pm 0.18	4.91
Hf	3.39 \pm 0.09	4.60 \pm 0.42	10.80 \pm 1.00	6.22
La	16.7 \pm 0.4	19.0 \pm 1.1	30.7 \pm 1.8	43.1
Lu	0.20 \pm 0.02	0.23 \pm 0.02	0.42 \pm 0.03	0.50
Na %	0.40 \pm 0.19	0.29 \pm 0.05	0.68 \pm 0.06	0.72
Sm	2.81 \pm 0.10	3.44 \pm 0.25	5.87 \pm 0.24	6.21
Sc	9.70 \pm 0.49	9.85 \pm 0.58	14.00 \pm 0.16	19.51
Ta	0.54 \pm 0.02	0.71 \pm 0.05	1.33 \pm 0.05	1.21
Th	4.45 \pm 0.35	4.85 \pm 0.27	7.60 \pm 0.40	15.36
Ti %	0.18 \pm 0.04	0.32 \pm 0.03	0.65 \pm 0.04	0.44
U	1.22 \pm 0.05	1.31 \pm 0.17	2.07 \pm 0.18	3.69
Yb	1.31 \pm 0.06	1.58 \pm 0.10	2.93 \pm 0.27	3.26

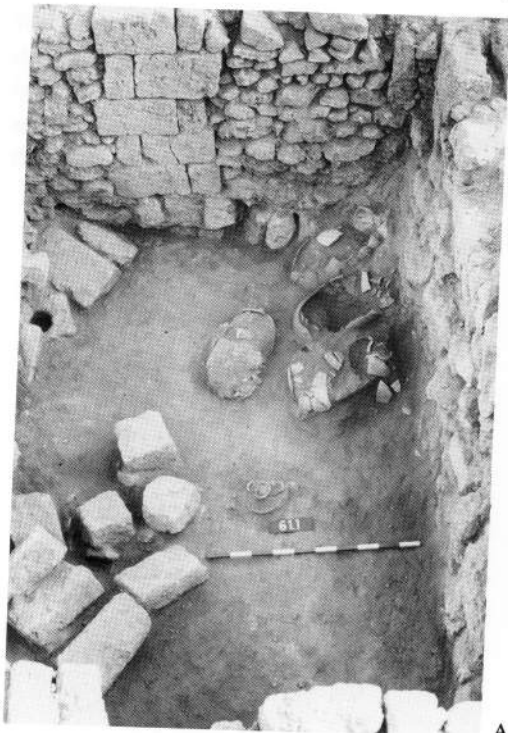
In the southern coastal region, clays occur which are quite different in composition. Many analyses have been made on pottery from Ashdod, which falls into a considerable number of chemical groups, all with the same pattern. One such group of 20 members is shown in the third column of Table 5. The great differences between the Ashdod group and the Megadim group are readily apparent; see, for example, the elements Ce, Co, Fe, Hf, Ta and Th. All other groups from Ashdod and other sites of the southern coast have the same pattern as the group shown. The reason that this group was chosen for display is that a Hellenistic juglet from Dor (DOR 1) matched this particular group.

Two other analysed vessels from Dor (DOR 6 and 7) were Knidian stamped jars which, like the juglet, are not connected with the present study. The data are shown in the fourth column of Table 5 only to illustrate the contrast in composition of pottery from another region. The two jars had almost identical compositions, so only the mean values are given.

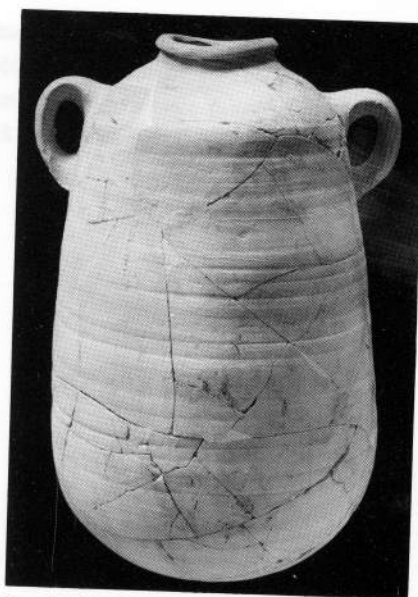
Summary

Storage-jars with Greek stamps are not uncommon at sites in Israel, but in most cases the vessel forms and the stamps clearly brand them as imports. The Dor group jars are unique in that up to now they have only been found at Dor, the inscriptions on the stamps have not yet been fully deciphered and the form of the jars is typically Levantine. Obviously, the determination of their provenience would be of value in

furthering the interpretation of these interesting vessels. The results of the study left no doubt that the jars were made in the northern coastal region of Israel. Though the laboratory evidence in conjunction with the archaeological evidence point to Dor itself as the source of these jars, further laboratory work would be helpful in making certain that nothing has been missed.



A: Stamped jar No. 10 *in situ* in Locus 611.



B: Jar No. 10 after restoration.



C: Stamp of IACO.



D: Stamp of ΛΑΠΙΩ.



E: Stamp of ATC.



F: Stamp of CΩΚ.

STAMPED HELLENISTIC STORAGE-JAR HANDLES FROM DOR