

## THE ABSOLUTE CHRONOLOGY OF LATE HELLADIC III A2 REVISITED<sup>1</sup>

AN analysis of 'The absolute chronology of the Late Helladic IIIA2' published in 1998 by the author<sup>2</sup> argued that the floruit of LH III A2 pottery should be extended from the 20–40 years proposed by Warren and Hankey (1370–60 to 1340–30 BC)<sup>3</sup> to a 50–90 year period (1390–70 to 1320–1300 BC).<sup>4</sup> Recent dendrological and dendro/radiocarbon research has raised questions, however, concerning the date proposed for the end of LH III A2 and the transition to LH III B. Further examination of the Mycenaean and Levanto-Mycenaean pottery from Kamid el-Loz in Syria has added additional relevant information, as has examination of the material from the Uluburun shipwreck.

Establishing the chronological position of LH III A2 pottery is significant with respect to the historical sequence of events in Western Asia, Egypt, the Dodecanese and the Aegean, as well as to the Mycenaean role in these areas. In addition, LH III A2 pottery serves as an important dating mechanism for the western Mediterranean, where neither Egyptian imports nor much scientific data are as yet available.<sup>5</sup> The III A2–B1 periods combined have been termed 'the Mycenaean century', but 'the Mycenaean century and a half' (perhaps 1385–1235 BC) may be more appropriate (see below). During these periods the ruler of Ahhiyawa, in all probability a mainland Mycenaean state, is listed in Hittite documents as one of four great kings. (His name is erased in, or at the end of, III B2.) At Miletus on the Anatolian coast, 98 per cent

<sup>1</sup> An abridged version of this paper was presented at a conference at University College London on 25 May 2002 held in memory of Vronwy Hankey in recognition of her assistance to colleagues and contributions to learning. I dedicate this paper to the memory of Vronwy and Henry Hankey.

<sup>2</sup> M. H. Wiener, 'The absolute chronology of the Late Helladic IIIA2', in M. S. Balmuth and R. H. Tykot (eds), *Sardinian and Aegean Chronology: Towards the Resolution of Relative and Absolute Dating in the Mediterranean. Proceedings of the International Colloquium 'Sardinian Stratigraphy and Mediterranean Chronology'*, Tufts University, Medford, Massachusetts, March 17–19, 1995 (Oxford, 1998), 309–19.

<sup>3</sup> P. Warren and V. Hankey, *Aegean Bronze Age Chronology* (Bristol, 1989). The authors note in a postscript (p. 214) that 'discoveries of substantial LM IIIA2 levels in southern Crete, especially Haghia Triada, may require this view to be modified'.

<sup>4</sup> Others have proposed spans ranging from the 20 years between 1360 and 1340 BC (E. Cline) to the 100 years between 1400 and 1300 BC (A. Furumark, A. Kanta); E. Cline, *Sailing the Wine-Dark Sea: International Trade and the Late Bronze Age Aegean* (Oxford, 1994); A. Furumark, *Mycenaean Pottery* (Stockholm, 1972). All dates herein follow the Egyptian Middle Chronology. See K. Kitchen, 'The basics of Egyptian chronology in relation to the Bronze Age', in P. Åström (ed.), *High, Middle or Low? Acts of an International Colloquium on Absolute Chronology Held at the University of Gothenburg 20–22 August 1987*, Part 1 (Göteborg, 1987), 37–55; id., 'History of Egypt (chronology)', *The Anchor Bible Dictionary*, ii (New York, 1992), 322–31; id., *The Third Intermediate Period in Egypt (1100–650 B.C.)*, 2nd revised edn. with supplement, (Warminster, 1996); id., 'The historical chronology of Ancient Egypt: a current

assessment', *Act. A.* (1996), 1–13; id., 'Regnal and genealogical data of Ancient Egypt (absolute chronology I): the historical chronology of Ancient Egypt, a current assessment', in M. Bietak (ed.), *The Synchronisation of Civilisations in the Eastern Mediterranean in the Second Millennium B.C. Proceedings of an International Symposium at Schloss Haindorf, 15th–17th of November 1996 and at the Austrian Academy, Vienna, 11th–12th of May 1998* (Vienna, 2000), 39–52; K. Kitchen and M. Bierbrier, *The Late New Kingdom in Egypt (c. 1300–664 B.C.)* (Warminster, 1975); E. Hornung, *Untersuchungen zur Chronologie und Geschichte des Neuen Reiches* (Wiesbaden, 1964); 'Chronologie in Bewegung', in M. Görg and E. Pusch (eds), *Festschrift Elmar Edel* (Bamberg, 1979), 247–52; J. von Beckerath, *Chronologie des ägyptischen Neuen Reiches* (Hildesheim, 1994); *Die Chronologie des pharaonischen Ägypten* (Mainz, 1997); R. Krauss, *Das Ende der Amarnazeit* (Hildesheim, 1978); id., *Sothis und Monddaten* (Hildesheim, 1985); W. Helck, 'Was kann die Ägyptologie wirklich zum Problem der absoluten Chronologie in der Bronzezeit beitragen?', in Åström (op. cit.), 18–26; id., 'Schwachstellen der Chronologie-Diskussion', *Göttinger Miszellen*, 70 (1983), 43–9; id., 'Chronologische Schwachstellen III', *Göttinger Miszellen*, 70 (1983), 31–2; U. Luft, 'Und noch einmal zum Ebers-Kalender', *Göttinger Miszellen*, 92 (1986), 69–77; Wiener (n. 2), Addendum, 315–17. A recent restatement of the Egyptian chronology position appears in M. Wiener, 'Time out: the current impasse in Bronze Age archaeological dating', in K. Foster and R. Laffineur (eds), *METRON: Measuring the Aegean Bronze Age. Proceedings of the Ninth International Aegean Conference, Yale University, 18–21 April 2002* (Aegaeum, 25 forthcoming).

<sup>5</sup> Wiener (n.2).

of the pottery in the LH III A2 levels recently excavated by W.-D. Niemeier is locally made or imported Mycenaean.<sup>6</sup> In Crete, the palace at Knossos is destroyed early in LM/LH III A2 and a major centre with Mycenaean features emerges at Haghia Triada in the Mesara plain in the south of Crete.

LH III A2 sees a dramatic increase in the amount of Mycenaean pottery, both imported and locally made, in Rhodes and Kos and in Cyprus and the Levant.<sup>7</sup> At Tell el-Amarna in Egypt, the largest known deposit provided the basis for Furumark's definition of LH III A2 pottery.<sup>8</sup> The scale and depth of LH and LM III A2 pottery deposits at many sites, for example at the Petsas House site at Mycenae (where construction, several additional building phases, and destruction all occurred within III A2), at Nichoria in Messenia (where three phases of LH III A2 pottery are distinguishable in three levels) and at Haghia Triada and Kommos in Crete with their major LM III A2 phases, suggest a period of major production longer than forty years. In the Argolid, LH III A2 also witnesses a massive peak in chamber tomb burials.<sup>9</sup>

The primary evidence for the duration of the LH III A2 period and its absolute chronology comes from Egyptian, and in one case Hittite, texts and interconnections. The beginning of the III A2 period is fixed approximately by the absence of III A2 pottery in Tomb 4 of the Sellopoulo cemetery of Knossos, whose last burial was of a woman wearing a necklace containing a faience scarab in excellent condition with a cartouche of Amenhotep III.<sup>10</sup> The burial was accompanied by an LM III A1 stirrup jar.<sup>11</sup> Amenhotep III became pharaoh in 1390 BC on the now widely accepted Egyptian Middle Chronology.<sup>12</sup> Accordingly the burial shows that LM III A1 must have continued at least into the beginning of the reign of that pharaoh. Two earlier burials in the tomb, on a different alignment from the final burial, were accompanied by LM III A1 pottery plus one imported piece of LH III A1 pottery. Of course someone buried in a high-status tomb during the LM III A2 period (or even later) could have been accompanied by a treasured, fine LM III A1 stirrup jar of the type found with the last burial, and III A2 could thus have begun before the accession of Amenhotep III. That the cartouche appears to have been copied by someone relatively unfamiliar with Egyptian hieroglyphs,<sup>13</sup> suggesting

<sup>6</sup> W.-D. Niemeier, 'The Mycenaean in Western Anatolia and the problem of the origin of the Sea Peoples', in S. Gitin, A. Mazar, and E. Stern (eds), *Mediterranean Peoples in Transition. Proceedings of the International Symposium in Jerusalem in Honor of T. Dothan, 3-7 April 1995* (Jerusalem, 1998), 44; id., 'The Mycenaean potter's quarter at Miletus', in R. Laffineur and P. P. Betancourt (eds), *TEXNH: Craftsmen, Craftswomen and Craftsmanship in the Aegean Bronze Age. Proceedings of the Sixth International Aegean Conference, Philadelphia, Temple University, 18-21 April 1996* (Aegaeum, 16; Liège, 1997), 347.

<sup>7</sup> Wiener (n. 2); C. Mee, 'A Mycenaean thalassocracy in the eastern Aegean?', in E. B. French and K. A. Wardle (eds), *Problems in Greek Prehistory: Papers Presented at the Centenary Conference of the British School of Archaeology at Athens, Manchester, April 1986* (Bristol, 1988), 301-6. Mee notes that pottery imported from the Argolid was particularly prevalent in Rhodian funerary deposits (C. Mee, 'Mycenaean overseas in the eastern Aegean and western Anatolia', paper presented at 'From Crete to Mycenae to Amarna: pots, pictures and places in the work of Vronwy Hankey', Institute of Archaeology, University College London, 25 May 2002). I am most grateful to Christopher Mee for providing me with his paper and for his advice generally.

<sup>8</sup> Warren and Hankey (n. 3), 149; Wiener (n. 2), 309 and works cited therein.

<sup>9</sup> Wiener (n. 2); K. S. Shelton, 'The excavation of Petsas House at Mycenae: drinking and dumping', paper presented at the 104th Annual Meeting of the Archaeological Institute of America, New Orleans, 5 Jan. 2003; S. Voutsaki, 'Social and political processes in the Mycenaean Argolid: the evidence from the mortuary practices', in R. Laffineur and W.-D. Niemeier (eds), *Politeia: Society and State in the Aegean Bronze Age. Proceedings of the Fifth International Aegean Conference, Heidelberg* (Aegaeum, 12; Liège, 1995), 55-66; id., 'Mortuary evidence, symbolic meanings and social change: a comparison between Messenia and the Argolid in the Mycenaean period', in K. Branigan (ed.), *Cemetery and Society in the Aegean Bronze Age* (Sheffield Studies in Aegean Archaeology, 1; Sheffield, 1998), 41-58; M. J. Alden, *Bronze Age Population Fluctuations in the Argolid from the Evidence of Mycenaean Tombs* (Göteborg, 1981), 326.

<sup>10</sup> M. Popham, 'Sellopoulo Tombs 3 and 4, two Late Minoan graves near Knossos', *BSA* 69 (1974), 216-17.

<sup>11</sup> *Ibid.*, 209.

<sup>12</sup> For recent statements of the Egyptian Middle Chronology position, see K. Kitchen (n. 4).

<sup>13</sup> S. Manning, *The Absolute Chronology of the Aegean Early Bronze Age* (Sheffield, 1995), 227.

production outside Egypt, may in fact indicate the passage of some time between the accession of Amenhotep III and the deposition of the necklace with the cartouche in Tomb 4. Moreover, the introduction of LH III A2 pottery appears to precede LM III A2.<sup>14</sup> On balance, the evidence suggests that LH III A2 begins in the earlier part of the reign of Amenhotep III, between 1390 and 1375 BC.

Warren and Hankey ended LH III A2 and began LH III B in 1340–30 BC primarily because they believed Mycenaean pottery of III B shape and decorative motif was already present at Amarna before *c.* 1333 in the third year of the reign of Tutankhamen, when the court and all its personnel departed. The site was then largely abandoned, although glass and faience production continued at Amarna for a few years thereafter and the quarrying of stone at the site for perhaps some years longer still (leaving open a slight possibility that a Mycenaean pot could have arrived after the court had departed). Among the seven whole or restored vessels and 1,350 sherds of LH III A2, two sherds from stirrup jars were described as III B1 by Warren and Hankey. One of the sherds (NCL 725 + 742) is in London with the bulk of the collection and the other is in Bonn (295.15). Hankey remarked that the London fragment 'stands out as different in fabric, shape and style from the run of III A2 pottery', and that the Bonn fragment's narrow neck and shoulder line suggest FS 171 or 173, which together with its lozenge pattern place it within the III B1 repertoire. Kaiser noted that the decorative motif of the Bonn sherd is known in III A2, but not its location on the shoulder zone.<sup>15</sup> Podzuweit<sup>16</sup> observed that what little comparanda exists for the Bonn sherd suggests a III B designation, but subject to the qualification that the dating of stirrup jars is particularly difficult due to the lack of adequate stratigraphic phasing in the Argolid itself.<sup>17</sup> Neither sherd was illustrated or specifically mentioned by Petrie, but both are registered as found by Petrie at Amarna, presumably in the central rubbish dumps,<sup>18</sup> although Petrie also recorded nine sherds as coming from the palace and three from House 11; a few sherds from other areas have been discovered subsequently. Hankey further reported that the three Minoan pieces from the deposit, from a cup and two coarseware pots, could span LM III A late to LM III B.<sup>19</sup>

In assessing whether III B1 pottery is already present at Amarna, it is important to understand that Furumark in his classification of Mycenaean pottery<sup>20</sup> did not develop his typological criteria based on deposits in Greece and then categorize the Amarna deposit, but rather used what he regarded as the closed and datable Amarna deposit as published by Petrie to define LH III A2. Accordingly, shapes and motifs (such as those of the sherds in question) not illustrated by Petrie and hence unknown to Furumark as part of the Amarna deposit were not included in Furumark's LH III A2 grouping, but placed instead in III B. Applying however the extant Furumark classifications with respect to the two Amarna stirrup jar fragments in question, E. French commented as follows:

Hankey has stated that two stirrup jars from Amarna (not known to Furumark), which she considers to be FS 173

7/ <sup>14</sup> B. P. Hallager, 'Mycenaean pottery in LM III A1 deposits at Khania, western Crete', in French–Wardle (n. 6), 180. P. Warren also noted the overlap of LM III A2 and LH III B at the Stratigraphic Museum Extension site at Knossos (Hallager, 181).

<sup>15</sup> B. Kaiser, *Corpus Vasorum Antiquorum. Deutschland*, 40 (Munich, 1976), 82–96.

<sup>16</sup> C. Podzuweit, 'Bemerkungen zur mykenischen Keramik von Tell el-Amarna', in C. Dobiati and D. Vorlauf (eds), *Festschrift für Otto-Hermann Frey zum 65. Geburtstag* (Marburg,

1994), 457–74.

<sup>17</sup> I am grateful to V. Hankey for these references.

<sup>18</sup> W. M. F. Petrie, *Tell el Amarna* (London, 1894), 16–17; Warren–Hankey (n. 3), 149; M. R. Popham, *The Destruction of the Palace at Knossos. Pottery of the Late Minoan III A Period* (Studies in Mediterranean Archaeology, 12; Göteborg, 1970), 84, n. 87.

<sup>19</sup> V. Hankey, pers. comm.

<sup>20</sup> A. Furumark, *Mycenaean Pottery* (Stockholm, 1941); for Amarna see ii, 113.

and 182, may still be considered LH III B1. Mountjoy has suggested<sup>21</sup> that Hankey 1995: 117, no. 8,<sup>22</sup> University College London 725–742, is FS 166 and thus ‘fine for A2 even with belly dec!’ (It could also be FS 178.)<sup>23</sup> It is the lozenge pattern on Hankey 1995: 117, no. 6; Bonn 295.15 that at first glance makes this piece appear to be LH III B. In fact the pattern, though not common, starts in LH III A2.<sup>24</sup> That the Amarna example comes early in the series is clear by contrast to the pot from Tell Aphek.<sup>25</sup> There is no justification for a reassessment of the whole group on the basis of this single piece. Accordingly, I see no archaeological reason to abandon the acceptance of the Amarna material as at least a homogeneous deposit, if not a closed one, of LH III A2.<sup>26</sup>

In any event, the appearance of the lozenge pattern decorative element, known if uncommon in III A2 but common in III B, on one pot from the deposit does not in itself provide a sufficient basis for concluding that the standard III B repertory of shapes and motifs is already extant in the Amarna period.

Dendrochronology appeared at one point to provide critical evidence for the continuation of LH III A2 use until *c.* 1300 BC. The case rested on two propositions: first, that the Anatolian ‘floating chronology’ of 1,503 continuous tree-ring years between the twenty-third and seventh century BC could be fixed in absolute years, and second, that a piece of dunnage or firewood from a shipwreck found off the southern coast of Turkey at Uluburun, which contained LH III A2 but no identifiable III B1 pottery, could be dated to 1305 BC or the years immediately following by comparison with the previously floating, but now putatively fixed, Anatolian dendrological dates.

The argument that the floating chronology could be fixed rested on three factors. First, the absolute dates appeared, and still appear, fixed within about twenty-five years by a large number of decadal radiocarbon determinations, and by the fact that the floating sequence ends in historical contexts at Gordion in Phrygia and Ayanis in Urartu. Second, the Anatolian sequence appeared to show the effects of two growth anomalies about 470 years apart with nothing significant between, thus fitting exactly the pattern found in the oaks of Ireland and England, where the dates are established through a continuous sequence of overlapping years in trees at 1628 BC and beginning at 1159 BC.<sup>27</sup> Third, the dates of beams from a temple built by Rusa II at Ayanis appeared to provide historical confirmation, for Ayanis was then believed on the basis of texts found at Bastam in Urartu to be the fifth and last of the fortress towns built by Rusa II, who is known to have died around 645 BC. Thus the years 655–651 BC assigned to the last rings of the temple timbers on the basis of the 1628 and 1159 BC match seemed a perfect fit.<sup>28</sup>

Recently both the proposed fixing of the floating chronology and the position within it of the branch from the Uluburun wreck have been subject to retraction or question by their initial proponents. First, a recent paper by Manning, Kromer, Kuniholm and Newton<sup>29</sup>

<sup>21</sup> Pers. comm.

<sup>22</sup> V. Hankey, ‘Stirrup jars at El-Amarna’, in W. V. Davies and L. Schofield (eds), *Egypt, the Aegean and the Levant. Interconnections in the Second Millennium B.C.* (London, 1995), 116–24; Warren–Hankey (n. 3), 150, fig. 9.

<sup>23</sup> P. Mountjoy observes (pers. comm.) that FS 178 does not usually have a decorated belly zone in III A2.

<sup>24</sup> E. French, ‘Late Helladic IIIA2 pottery from Mycenae’, *BSA* 60 (1965), 159–202.

<sup>25</sup> Warren–Hankey (n. 3), 155, fig. 10.

<sup>26</sup> I am most grateful to E. French for this assessment and for permission to quote it here, and to P. Mountjoy as well.

<sup>27</sup> S. W. Manning in *A Test of Time* (Oxford, 1999), 314, stated the prior case as follows: ‘The 1628 B.C. and 1159–1141

B.C. tree-ring events are the only major tree-ring growth anomalies in the entire second millennium B.C. in the Irish dendrochronology. Therefore the correlation, within the possible dating window established by the high precision radiocarbon dating and wiggle-match, of the Anatolian and Irish dendrochronologies at both these decisive points provides a clear case for being able to apply the absolute dates from the Irish dendrochronology (and its European associates) to the Anatolian dendrochronology’.

<sup>28</sup> Wiener (n. 2), 314.

<sup>29</sup> S. W. Manning, B. Kromer, P. I. Kuniholm, and M. W. Newton, ‘Anatolian tree rings and a new chronology for the East Mediterranean Bronze–Iron Ages’, *Science*, 294 (21 Dec. 2001), 2532–5.

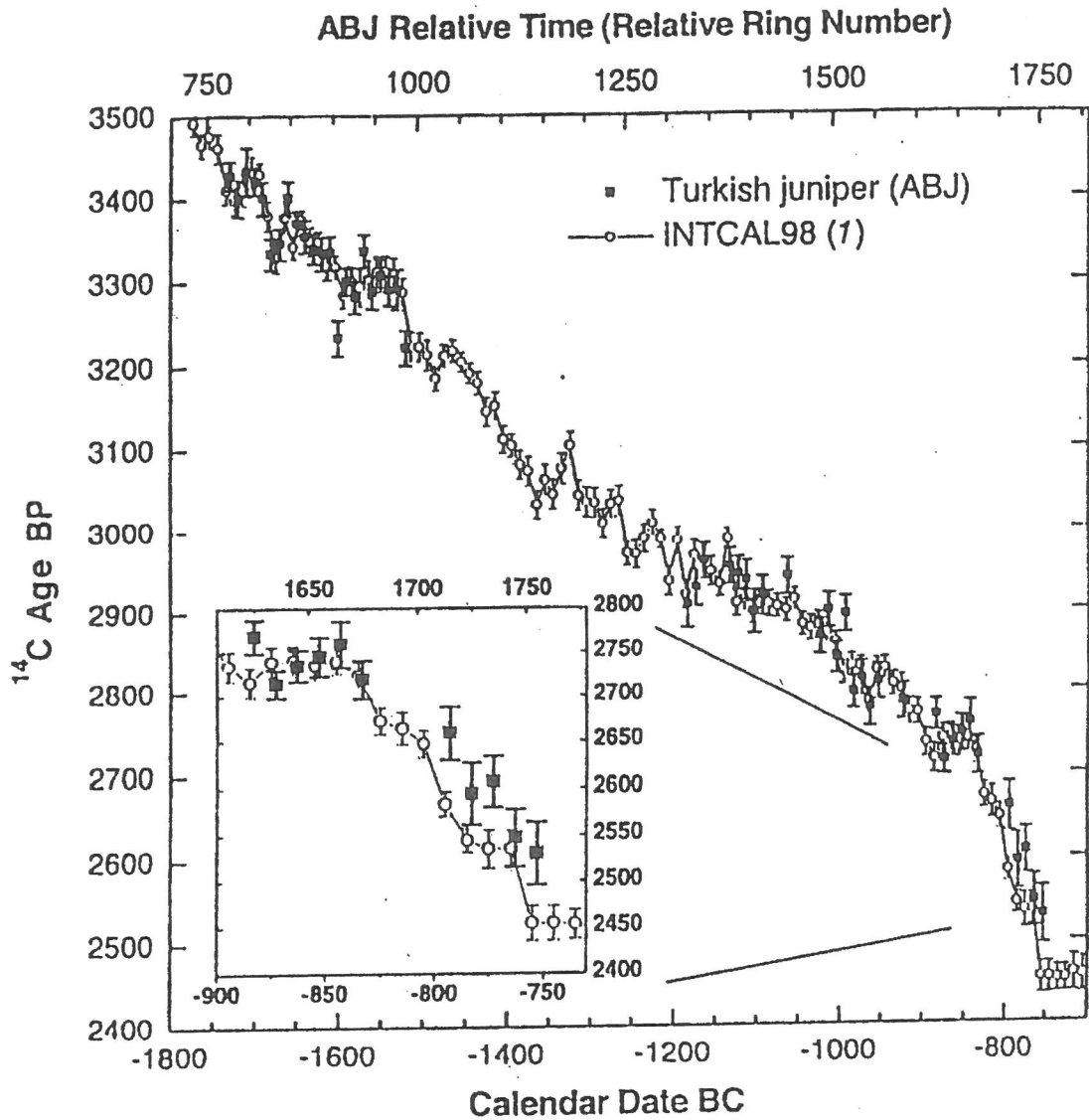


FIG. 1. Wiggle-match of 52  $^{14}\text{C}$  decadal age determinations of the floating Aegean Bronze Age juniper chronology to the internationally recommended INTCAL98 calibration data set (1). In the interval from the mid-9th to mid-8th centuries B.C. (inset), a period of rising atmospheric  $^{14}\text{C}$  levels (strongly declining  $^{14}\text{C}$  ages), a significant  $^{14}\text{C}$  age difference exists between Central Europe and Anatolia. From: B. Kromer, S. W. Manning, P. I. Kuniholm, M. W. Newton, M. Spurk and I. Levin, 'Regional  $^{14}\text{CO}_2$  Offsets in the Troposphere: Magnitude, Mechanisms, and Consequences', *Science* 294 (2001), 2531, fig. 3.

suggests moving the 1,503-year Anatolian floating sequence back  $22 \pm 4/-7$  years, based on a wiggle-match of radiocarbon determinations obtained from the Anatolian sequence against the INTCAL98 calibration curve (FIG. 1). Forty-four of the fifty-seven decadal determinations show a better overall fit as a consequence of this adjustment. A century of cold weather affecting differently the growing seasons and hence the absorption of radiocarbon by trees in Europe versus Anatolia is proposed as the explanation for the remaining decades, where the oscillations in the radiocarbon ages in the Anatolian floating chronology do not match the oscillations in the calibration curve based on trees from Germany and Ireland.<sup>30</sup> The proposed shift would also bring an upward spike in the Anatolian sequence in line with a similar spike in the calibration curve at 1325 BC. S. Manning's judgement, based on best current data as of January 2003, that the  $22 \pm 4/-7$  year adjustment should be accepted at the 95% confidence level seems appropriate.<sup>31</sup>

The  $22 \pm 4/-7$  year adjustment would move the date for the major seventeenth century BC growth anomaly noted in the Anatolian trees, possibly caused by a climate-affecting volcanic eruption, from 1628 BC to 1650 BC  $\pm 4/-7$  years, thus divorcing it from the event noted both in the oaks of Ireland and England and in the long-lived bristlecone and foxtail pines of California, where the dates of course remain 1628. The shift in itself would also move the later Anatolian dendrological event from 1159 BC to 1181 BC  $\pm 4/-7$ , again separating an event reflected in Anatolian trees from an event affecting English and Irish oaks. (However, Peter Kuniholm has kindly informed me that further examination of dendrological samples plus the incorporation of the proposed  $22 \pm 4/-7$  year shift indicates that the twelfth century BC anomaly in the Anatolian trees was centred between *c.* 1174 and 1162 BC.<sup>32</sup>) Absent the disclaimer contained in the paragraphs following, the branch from the Uluburun wreck with its III A2 pottery would thus rise in date by  $22 \pm 4/-7$  years to a final observable ring date of 1327 BC  $\pm 4/-7$  for the sinking of a ship containing III A2 but no identifiable III B pottery.

Unfortunately, however, just as the absolute dates represented by the 1,503 years of the Anatolian floating chronology are uncertain within a range of at least a decade, so also the place of the branch of wood from the Uluburun shipwreck *within* the Gordion sequence is now in doubt. The last observable ring, thought to be at or near the bark, and hence the earliest possible date for the sinking of the vessel, was initially published with a date of 1316 BC.<sup>33</sup> and subsequently revised to 1305 BC after further examination of the branch upon the completion of the three-year drying process disclosed eleven additional rings, ten of which came from a newly observable node in the reverse side of the timber. The placement of the Uluburun branch within the Gordion floating sequence was based on close visual examination, after comparison by computer proved inconclusive; the visual examination was reported to indicate a better match here than at any point fifty years in either direction.<sup>34</sup> In the intervening five years, many additional Anatolian logs have been located, conserved and analyzed

<sup>30</sup> The issues raised by this proposed radiocarbon-based shift in the dendrological dates for the Anatolian floating chronology are addressed in detail in my forthcoming study entitled 'Time Out: The Current Impasse in Bronze Age Archaeological Dating' (Wiener, forthcoming [n. 4]), which concludes that the proposed shift in dates, while not free of all doubt, should be accepted as providing the best approximation of dates for the Anatolian sequence presently available.

<sup>31</sup> B. Kromer, 'Atmospheric <sup>14</sup>C levels from tree ring chronologies back to 12,400 BP: a tracer of natural climate

variability in the Holocene', lecture delivered at Cornell University on 29 Oct. 2002, and pers. comm.; S. Manning, pers. comm. I am grateful to both colleagues.

<sup>32</sup> Pers. comm. of 17 May 2002.

<sup>33</sup> P. I. Kuniholm, *Aegean Dendrochronology Project: 1996 Annual Progress Report* (Ithaca, New York, 1996); C. Pulak, 'The Uluburun shipwreck', in R. Hohlfelder and S. Swiny (eds), *Res Maritima 1994: Cyprus and the Eastern Mediterranean, Prehistory Through the Roman Period* (Atlanta, 1997), 233-62.

<sup>34</sup> Wiener (n. 2), 314 and pers. comm.

by the Laboratory for Near Eastern and Aegean Dendrochronology. Director Peter Kuniholm has recently informed me that after considering this substantial body of new evidence, he and his colleagues are no longer confident as to the visual fit of the Uluburun branch within the Anatolian floating sequence, and would prefer to suspend judgement until additional dendrological material from the Uluburun ship is received and examined, and current work comparing climate patterns reflected in wood from Anatolia with wood from Syria and the Levant can be completed.<sup>35</sup> In addition, while dunnage or firewood would not have been deliberately aged, as may sometimes be the case with logs used in construction, nevertheless the possibility exists that dunnage (which may have been collected to cushion oxhide ingots in transit, for example) could have been reused for a period of time.<sup>36</sup>

The Uluburun wreck with its impressive international cargo provides other material containing potential information respecting the date of the wreck and its complement of III A2 pottery. First, the glass ingots aboard may be traceable to Amarna itself. A recent comparison of the concentric ridges and moulds on the backs of circular glass ingots from the wreck with cylindrical vessels believed to be moulds from a glass factory at Amarna shows a close fit.<sup>37</sup> Chemical analysis of the ingots reveals a composition very similar to the composition of cobalt blue glass found both in Egypt and at Mycenaean sites.<sup>38</sup> Glass as well as pottery links Amarna in Egypt to the Mycenaean world, with ships such as the one found at Uluburun as a means of transmission.<sup>39</sup> J. Henderson suggests that the stratigraphy of site O45.1 at Amarna, where the moulds were found, places it early in the Amarna period.<sup>40</sup> Glass and faience production may have continued at Amarna after its abandonment as a pharaonic capital and religious centre around 1333 BC,<sup>41</sup> but only for a few years at most. Sites such as Gurob in the Fayum and Qantir in the Delta produced glass into the Ramesside period, however,<sup>42</sup> and it is possible that there was no change in the form of the glass moulds used at these sites from those of Amarna.

The wreck also contained a gold scarab of Nefertiti, who disappears from Egyptian history around 1327 BC on the Middle Chronology (where the readjusted dating of the Uluburun branch after the proposed 22 +4/-7 year shift in the Anatolian floating sequence would place it, had the location of the branch within the Anatolian sequence not become the subject of reconsideration, as stated above). The scarab, however, showed much wear, and was found on

9/ <sup>35</sup> See Manning *et al.* (n. 28), 2535, n. 38. I am most grateful to Professor Kuniholm for this information. Archaeological scientists as well as excavators sometimes find that it is necessary to correct a preliminary report.

<sup>36</sup> I am grateful to M. Newton for calling this possibility to my attention.

<sup>37</sup> P. T. Nicholson and J. Henderson, 'Glass', in P. T. Nicholson and I. Shaw (eds), *Ancient Egyptian Materials and Technology* (Cambridge, 2000), 195-222, esp. 200. The comparison was made possible through the provision of a cast of the Uluburun ingots by G. Bass and C. Pulak. See also C. Pulak, 'The cargo of the Uluburun ship and evidence for trade with the Aegean and beyond', in L. Bonfante and V. Karageorghis (eds), *Italy and Cyprus in Antiquity, 1500-450 B.C. Proceedings of an International Symposium Held at the Italian Academy for Advanced Studies in America at Columbia University, November 16-18 2000* (Nicosia, 2001).

7/ <sup>38</sup> Nicholson and Henderson (n. 36), 200, citing G. Bass 'Oldest known shipwreck reveals splendors of the Bronze

Age', *National Geographic*, 172 (1987), 692-733; C. M. Jackson, P. T. Nicholson, and W. Gneisinger, 'Glass-making at Tell el-Amarna: an integrated approach', *Journal of Glass Studies*, 40 (1998), 11-23.

<sup>39</sup> Another LH III A2 link has been suggested in the form of possible Mycenaean warriors or at least their equipment. L. Schofield and R. B. Parkinson, 'Of helmets and heretics: a possible Egyptian representation of Mycenaean warriors on a papyrus from el-Amarna', *BSA* 89 (1994), 157-70.

<sup>40</sup> Nicholson-Henderson (n. 37), 204. Presumably this would imply a date between about 1360 and 1345 B.C. on the Egyptian Middle Chronology.

<sup>41</sup> Warren-Hankey (n. 3), 149.

<sup>42</sup> Nicholson-Henderson (n. 37), 205; E. B. Pusch, 'Glasproduktion in Qantir', *Ägypten und Levante*, 9 (1999) 111-20; T. Rehren and E. B. Pusch, 'Glass and glass making at Qantir-Pirameses and beyond', *Ägypten und Levante*, 9 (1999) 171-9. I am grateful to David Aston for reminding me of the papers by E. B. Pusch.

the seabed near a damaged scarab 150 years older, two Second Intermediate Period scarabs 300–400 years older, and half of a badly worn ring deliberately cut in half, which suggests that the objects were scrap metal and bric-a-brac.<sup>43</sup> Either a gold scarab of Nefertiti was treated as scrap during her reign, perhaps by someone not Egyptian, or a date post-1327 BC for the wreck seems indicated by this evidence.

Other means for dating the Uluburun wreck have been proposed. E. French notes that the lips of stirrup jars from the ship are identical to stirrup jars from Amarna, and believes that the date of the wreck is just after the Amarna period.<sup>44</sup> One of the seals recovered depicts the Assyrian hero in a short kilt, a motif not attested before 1320 and typical of the thirteenth century, according to Matthews.<sup>45</sup> Assyrian dates are moveable by a few years, however. Oren believes that a Canaanite biconical krater from the wreck is of a type whose contexts thus far are thirteenth- rather than fourteenth-century.<sup>46</sup> The Cypriote pottery is now under study by C. Hirschfeld. R. Merrillees believes that one of the Cypriote bucchero jugs found was not made much before 1300 BC, whereas J. Smith doubts that the jug can be chronologically confined in this manner, given differences between regions of Cyprus with respect to the time of first production and exchange of pottery types in this period. ~~V. Karageorghis and C. Bergoffen also believe that the Cypriote pottery from the wreck suggests a date near the end of the thirteenth century BC.~~<sup>47</sup>

Even if the Uluburun wreck can be more closely dated in the future by dendrochronology or the archaeological contexts of comparanda, the placement of its Aegean pottery within the LH III A2 sequence of the Argolid presents additional problems. Preliminary examination indicates differing dates within III A2 and a variety of places of origin. Some of the III A2 pottery appears on preliminary visual examination to come from the Dodecanese and some perhaps Anatolia. Moreover, the pots aboard include transport vessels which may continue in use for considerable periods.<sup>48</sup> Thus, while the enormous value of the contents of the Uluburun ship and the fact that it sank at a time of extensive trade between the East and the Aegean may suggest that the Mycenaean pottery aboard is likely to have been of recent manufacture, the other factors cited, including in particular that none of the recovered pottery is recognized at present as coming from the Argolid, leave open the possibility that LH III B pots were already in general production in the Argolid when the Uluburun ship with its III A2 cargo went down.

Another chronological point of reference for the LH III A2–B1 transition is provided by the current excavation of Bronze Age Miletus under the direction of W.-D. Niemeier. All or almost all the pottery from the destruction following the ‘Second Building Period’ of Bronze Age Miletus, a major Anatolian coastal site where imported and locally made pottery of Mycenaean shape, decoration and method of manufacture comprises about 95 per cent of all vessels, is LH III A2. The two sherds that may be exceptions are fragments of kylikes with octopus decoration of a type that Furumark classified as transitional III A2–B1. The best-known comparanda come from multi-period tombs in Rhodes and Kos rather than from stratified

<sup>43</sup> J. Weinstein, ‘The Bronze Age shipwreck at Ulu Burun: 1986 campaign: III. The gold scarab of Nefertiti from Ulu Burun: its implications for Egyptian history and Egyptian–Aegean relations’, *AJA* 93 (1989), 23.

<sup>44</sup> Pers. comm. for which I am most grateful.

<sup>45</sup> Pers. comm. conveyed by Dominique Collon, for which I am most grateful.

<sup>46</sup> Pers. comm. of 8 Apr. 1997, for which I am most grateful.

<sup>47</sup> Pers. comms. for which I am most grateful; J. Smith, letter of 4 Jan. 2003. The bucchero jug in question is illustrated in G. Bass, ‘A Bronze Age shipwreck at Ulu Burun (Kaş): 1984 campaign’, *AJA* 90 (1986), 281.

<sup>48</sup> I am grateful to J. Rutter, who is publishing the pottery, and to E. French for discussing it with me and for these observations.

V. Karageorghis suggests a “very late fourteenth century BC” date for the Cypriote pottery, C. Bergoffen a thirteenth century date.



deposits, thus making precise chronological placement difficult. Based on present evidence, the destruction may have occurred toward the end of III A2, when certain III B decorative devices were perhaps beginning to appear.<sup>49</sup>

If the site called 'Millawanda' in the Hittite texts is Miletus as now seems almost certain, then a probable link to historical chronology exists. Niemeier has summarized the evidence as follows:

In an unfortunately mutilated passage in The Annals of Mursili II, Millawanda is mentioned together with Arzawa and Ahhiyawa in connection with the upheavals which followed Mursili's accession. According to the most plausible reading, that of A. Goetze<sup>50</sup> and followed by other scholars,<sup>51</sup> Arzawa, Ahhiyawa and Millawanda formed an alliance against Mursili. In a first response, Mursili in the third year of his reign sent forth two generals, Gulla and Malaziti, probably against Millawanda. It has been suggested that the destruction of Miletus level V was caused by this attack.<sup>52</sup> Since the dates proposed in these sources for the accession of Mursili II are 1322<sup>53</sup> or 1318 BC<sup>54</sup> the attack in his third year would accordingly occur in 1320 or 1316.<sup>55</sup>

LH III A2 continues into the thirteenth century in certain contexts, for example at Saqqara in the burial shaft of the Tomb of Horemheb constructed in 1295 BC on the Egyptian Middle Chronology.<sup>56</sup> Of course the LH III A2 pottery in question may have been in Egypt for decades before it was deposited, or it may have been intrusive, entering with the earth used in the fill of the tomb. The Late Minoan III A2 pottery of Zafer Papoura Tomb 99 at Knossos in Crete was accompanied by a scarab of Ramses I, whose reign began in 1295 BC.<sup>57</sup> Late Minoan III A2, however, may continue in Crete after LH III B succeeds LH III A2 as the predominant style in the Argolid and in other parts of Greece, as suggested below.

The date when LH III A2 pottery ceases to be common can only be established within about a generation on the foregoing evidence. Accordingly it is appropriate to consider further the evidence for the first appearance of LH III B. Warren and Hankey stated the general position as of 1989 as follows:

The reign of Ramses II, from 1279 to 1213 BC, provides the basic correlation for LH III B wherever pottery of LH

<sup>49</sup> B. and W.-D. Niemeier, 'Milet 1994-1995. Projekt "Minoisch-mykenisches bis protogeometrisches Milet": Zielsetzung und Grabungen auf dem Stadionhügel und am Athenatempel', *AA* 1997, 197; W.-D. Niemeier 1997 (n. 6); id., 1998 (n. 6), 32-3; id., pers. comm. For the settlement sequence of prehistoric Miletus as established by the new excavations see W.-D. Niemeier, in A. M. Greaves and B. Helwing, 'Archaeology in Turkey: the Stone, Bronze, and Iron Ages, 1997-1999', *AJA* 105 (2001), 505-6. See also J. D. Hawkins, 'Tarkasnawa King of Mira "Tarkondemos", Boğazköy Sealings and Karabel', *Anatolian Studies*, 48 (1998), 1-31.

<sup>50</sup> A. Goetze, 'Die Annalen des Mursilis', *Mitteilungen der vorderasiatisch-ägyptischen Gesellschaft*, 38 (1933), 36-8, 253-4.

<sup>51</sup> S. Heinhold-Krahmer, *Arzawa. Texte der Hethiter* 8 (Heidelberg, 1977), 62-4; H. G. Güterbock, 'The Hittites and the Aegean world I: the Ahhiyawa problem reconsidered', *AJA* 87 (1983), 135; T. R. Bryce, 'The nature of Mycenaean involvement in western Anatolia', *Historia*, 38 (1989) and 'Ahhiyawans and Mycenaean—an Anatolian viewpoint', *OJA* 8 (1989), 299.

<sup>52</sup> M. J. Mellink, 'The Hittites and the Aegean world II: archaeological comments on Ahhiyawa-Achaians in western Anatolia', *AJA* 87 (1983), 139-40; W.-D. Niemeier, 'Mycenaean and Hittites in war in western Asia Minor', in R. Laffineur (ed.), *Polemos: Le contexte guerrier en Égée à l'âge du*

*bronze* (Aegaeum, 19; Liège and Austin, 1999), 150-1. Hawkins 1998 (n. 49), 28 considers this suggestion possible but points out, that 'it infers more than the text records'.

<sup>53</sup> G. Wilhelm and J. Boese, 'Absolute Chronologie und die hethitische Geschichte des 15. und 14. Jahrhunderts v. Chr.', in *Äström* (n. 4), 108, table on 117.

<sup>54</sup> Wilhelm and Boese (n. 53); F. Starke, 'Hattusa', in *Der Neue Pauly, Enzyklopädie der Antike* 5 (Stuttgart and Wiemar, 1998), table on 191-2.

<sup>55</sup> I am deeply grateful to W.-D. Niemeier for this communication and his permission to publish it here. See also Niemeier-Niemeier (n. 46) and Niemeier (n. 6).

<sup>56</sup> V. Hankey and D. Aston, 'Mycenaean pottery at Saqqara: finds from excavations by the Egypt Exploration Society of London and the Rijksmuseum van Oudheden, Leiden, 1975-1990', in J. B. Carter and S. P. Morris (eds), *The Ages of Homer: A Tribute to Emily Townsend Vermeule* (Austin, 1995), 69. I am grateful to Peter Warren for bringing this article to my attention.

<sup>57</sup> A. J. Evans, *The Prehistoric Tombs of Knossos I: The Cemetery of Zafer Papoura* (London, 1906), 87-90. Indeed, some III A2 even appears in the shaft of a tomb of a Ramesside princess buried during the reign of Merneptah toward the end of the 13th c., about 100 years into the III B era, but there is a possibility that the III A2 pottery was intrusive (G. T. Martin, cited in Warren-Hankey [n. 3]).

III B (and a little of LM III B) has been excavated in Egyptian contexts or those with an Egyptian connection. Indeed, from Egypt to Anatolia, along the Levant coast and further inland, it is almost axiomatic in deposits or levels approximately dated to the thirteenth century BC, that pottery of LH III B and a small amount of LM III B, imported or of Aegean inspiration, will be found (usually as a minor element) with Cypriote pottery and Egyptian objects of the XIXth Dynasty. Results of recent study and excavation have confirmed this general correlation, but closely dated links are elusive.<sup>58</sup>

E. Oren has observed that at Levantine sites where both Mycenaean pottery and Egyptian objects appear, such as Lachish, Tell Abu-Hawam, and Megiddo, III B is associated with material of the Nineteenth Dynasty beginning in 1295 BC.<sup>59</sup> An earlier appearance of LH III B based on a connection to Tutankhamen has been asserted on the basis of 'delicate little blue pendants' of that pharaoh found in a LH III B stirrup jar from a pit at Gurob in Egypt,<sup>60</sup> the 'burnt groups' at Gurob are no earlier than the reign of Ramses II as M. Bell has shown. (P. Åström has also noted that the placement of the pendants in the jar need not be contemporary with Tutankhamen's reign.<sup>61</sup>)

An Amarna period context has been proposed for LH III B pottery found at Kamid el-Loz, the ancient Kumidi, at the southeastern edge of the Bekaa Valley in Syria. The site is situated atop one of the largest and highest hills in the valley at the junction of two ancient major roads, one coming from the Mediterranean coast.<sup>62</sup> Excavation revealed a palace with six Amarna-type tablets, plus a temple with an annex and two courtyards with altars which produced III B material. V. Hankey examined nine Mycenaean vessels and one psi figurine from this area and concluded that one rhyton, one kylix and the psi figurine were III B. E. French also identified the kylix (KL 69:13)<sup>63</sup> as clearly LH III B1 in both shape and decoration, but believed the rhyton (KL 72:333) and the psi figurine (KL 69:266) could equally well be III A2.<sup>64</sup> In dating the material Warren and Hankey followed the preliminary interpretation of the excavator that the site had suffered a single destruction without reoccupation, thus placing the III B material in the same chronological context as the Amarna tablets.<sup>65</sup> As to the palace, a fourteenth-century date for the destruction which contained the Amarna tablets seems indeed likely. Although the Egyptian court continued to correspond with Syrian rulers and vassals after the transfer of the capital from Amarna to Memphis, if a name difficult to read on one of the Kamid el-Loz tablets is 'Biryawaza, mayor of Damascus, rather than Biridiya, mayor of Megiddo, and if the addressee of Amarna letter 7 is Akhenaten'<sup>66</sup> then this Kamid el-Loz tablet at least should date from the Amarna period and thus have been composed no later than about 1330 BC. Of course the tablets could have been retained by the palace at Kamid el-Loz after their receipt, since references to prior events, relationships, and exchanges of goods indicate that some records of correspondence with the Egyptian court were retained by other courts for generations.<sup>67</sup> However, E. Oren believes that the local Syro-

<sup>58</sup> Warren-Hankey (n. 3), 154.

<sup>59</sup> Pers. comm. 8 Apr. 1997.

<sup>60</sup> W. M. F. Petrie, *Illahun, Kahun and Gurob* (London, 1891), 17; T. G. H. James, cit. P. Åström, 'Supplementary material from Ayios Iakovos Tomb 8', *Op. Ath.* 4 (1962), 223 n. 1; Warren-Hankey (n. 3), 154.

<sup>61</sup> Åström (n. 59), 207-24; M. R. Bell, 'Gurob Tomb 605 and Mycenaean chronology', *Mélanges Gamal Eddin Mokhtar*, 1 (Cairo, 1985), 61; I am grateful to David Aston for calling the Bell publication to my attention.

<sup>62</sup> L. Badre, 'Kamid el-Loz', in E. M. Meyers (ed.), *The*

*Oxford Encyclopedia of Archaeology in the Near East*, iii (Oxford, 1997), 265.

<sup>63</sup> R. Hachmann, *Kamid el-Loz* (Bonn, 1980), 88, pl. 26. 2.

<sup>64</sup> Wiener (n. 2), 311.

<sup>65</sup> While it is conceivable that the former temple courtyard could have served as a shrine after the destruction, it is unlikely that Mycenaean pottery would have been imported under such circumstances.

<sup>66</sup> Wiener (n. 2), 311.

<sup>67</sup> See e.g. tablet EA 29 in W. L. Moran, *The Amarna Letters* (Baltimore, 1992), 92-9.

Canaanite pottery found with the tablets in the palace indicates a fourteenth-century destruction date.<sup>68</sup>

The critical issue posed by the Kamid el-Loz deposit, however, is whether the temple and temple-courtyard/altar area was abandoned at the same time as the palace and never reoccupied. A systematic examination by E. Oren of the preliminary and final excavation reports has noted far more Mycenaean and Levanto-Mycenaean pottery of various periods than the vessels seen by V. Hankey. Oren reports that the site produced over fifty Mycenaean or Mycenaean-type vessels of various periods, including some that were III A2 late to III B early, some mid III B, some later III B or its derivatives, Levanto-Mycenaean or Simple Style, and a few which appear to be III C (FS 284) or its local derivative. Oren notes that the Mycenaean and Levanto-Mycenaean pottery from Kamid el-Loz accordingly resembles the pottery from Ras Shamra-Ugarit in its composition, and that Kamid el-Loz was an extremely important and well-documented excavation.<sup>69</sup> Oren's analysis suggests that the temple-courtyard area and/or other sectors at Kamid el-Loz may have been used for over a century after the end of the Amarna period. Accordingly, unless further examination discloses LH III B at the palace clearly associated with the Amarna tablets, the Kamid el-Loz assemblage does not provide satisfactory support for the appearance of LH III B in or near the Amarna period.

The Tomb of Maya (perhaps the most powerful official in Egypt in the reign of Horemheb) and his wife Meryt at Saqqara contained five sherds from two Mycenaean stirrup jars, one of which has been proposed as evidence of the appearance of LH III B in Egypt by 1313 BC. Although Warren and Hankey (1989)<sup>70</sup> describes the two pots as 'undistinguished borderline specimens, making it difficult to say emphatically whether they should be classed as LH III A2 late or early III B', Hankey after further consideration concluded in an article published in 1995 that one of the jars should be regarded as III B.<sup>71</sup> No reason is given for the change of opinion. E. French notes that the exact details are difficult to discern from the published photograph and drawing. She considers the linear decoration uncanonical and points out that there is no decorated body zone and that the paint is said to be red, both features which suggest III A2 rather than III B1. French adds that the chronology of the III A2–B transition should not turn on this one pot. J. Rutter concurs, noting that the stirrup jar in question is an oddity.<sup>72</sup>

The tomb contained the skeletons of two males, two females and a child, plus a great many local vessels including a jar with a docket of the Year 9 of Horemheb, 1314–13 BC on the Middle Chronology.<sup>73</sup> Evidence exists that Maya was active one year before the date of the docket, for in Year 8 of Horemheb Maya is recorded as examining and restoring the Tomb of Tuthmosis IV.<sup>74</sup> Unfortunately it was not possible to determine whether the Egyptian docketed jar and the Mycenaean stirrup jar belonged to the same burial. A relief scene from the pylon gateway showing Meryt and Maya's stepmother Henutiunu with arms upraised in adoration welcoming Maya to the tomb suggests that they were buried before Maya, but the

<sup>68</sup> I am greatly indebted to Eliezer Oren for this information (pers. comm.).

<sup>69</sup> Pers. comm. of 29 Sept. 2002, for which I am most grateful.

<sup>70</sup> Warren – Hankey (n. 3), 151–2.

<sup>71</sup> Hankey–Aston (n. 56).

<sup>72</sup> Pers. comms. for which I am most grateful.

<sup>73</sup> G. T. Martin, *The Hidden Tombs of Memphis* (New York, 1991), 182; J. van Dijk, 'The Overseer of the Treasury Maya: a

biographical sketch', *Oudheidkundige Mededelingen uit het Rijksmuseum van Oudheden te Leiden* 70 (1990), 25; M. J. Raven, 'The site and its history' and E. Strouhal, 'The skeletal remains', in M. J. Raven, *The Tomb of Maya and Meryt*, Pt. 2: *Objects and Skeletal Remains* (London and Leiden, 2001), 1–18, 80–97. I am grateful to David Aston for information concerning these publications and to Jacobus van Dijk for his comments and corrections on this section of the paper.

<sup>74</sup> Martin (n. 73), 148–9.

remains of an approximately forty-year-old male, perhaps one of Maya's younger brothers, one of whom was responsible for preparing Maya's burial, may have been interred later.<sup>75</sup>

In sum, the Mycenaean stirrup jar cannot be safely categorized as III B and may have been in a pre- or post-1313 BC burial. Of course the deposit of the jar in Egypt may have come some years later than the first appearance of its decorative motif in the Argolid. Moreover, even if the jar slightly postdates canonical late LH III A2, the putative 1320–1316 BC Miletus destruction level (which is marked by the presence of significant amounts of late LH III A2 pottery and two sherds which may be considered transitional III A2–B but nothing typically III B) could easily be followed by the appearance of a transitional III A2–B example in the Tomb of Maya shortly thereafter within the chronology here proposed.

The foregoing discussion indicates that firm evidence for the central date of the transition from LH III A2 to LH III B is still lacking. Of course transitions require time, in this case the time between the first appearance of III B shapes and motifs and the time they become predominant. All of the new shapes and motifs associated with LH III B pottery are unlikely to have been introduced at once, and at all places of production.<sup>76</sup> Differing local trajectories require consideration. The Mycenaean pottery of Amarna was imported from the Argolid, the likely leader in stylistic innovation.<sup>77</sup> LH III A2 pottery made locally or imported from areas other than the Argolid may have been produced at a time when III B was already in standard use at Mycenae and Tiryns.<sup>78</sup> Thus III B may begin later at Miletus than Mycenae. The introduction of LH III A2 appears to precede LM III A2,<sup>79</sup> and LH III B seems clearly to precede LM III B, perhaps by more than a decade.<sup>80</sup> The burials in Knossos Zafer Papoura Cemetery Tomb 99<sup>81</sup> with its Nineteenth Dynasty scarab must come some years after the accession of Ramses I in 1295 BC as noted above. The only diagnostic pottery in the tomb, however, is LM III A2, although some pots or sherds may represent types which continue into LM III B.<sup>82</sup>

In summary, on present evidence:

- (i) the transition from LH III A1 to III A2 pottery styles occurs between 1390 and 1375 BC.
- (ii) the transition from LH III A2 to III B1 begins and ends between 1330 and 1290 BC, but in many areas does not occur in the main before 1315–1305 BC.

*The Institute for Aegean Prehistory*

MALCOLM H. WIENER

<sup>75</sup> Martin (n. 73), 172; Strouhal (n. 73), 86.

<sup>76</sup> Indeed, consecutive pottery styles may overlap for a considerable period; for example, Athenian black-figure pottery continues in production for three decades while the Pioneers and their successors develop red-figure in Athens, and one special type of black-figure vessel, the Panathenaic amphora, continues in production for more than another century. I am grateful to Peter Warren and John Papadopoulos for comments on my original paper making this point, and for their observations concerning regionalism as well.

<sup>77</sup> Neutron activation analysis (NAA) of certain III A2 and III B pictorial vessels found in Egypt and Cyprus indicates that a number of them were composed of clays from the Mycenae-Berbaui area (H. Mommsen and J. Maran, 'Production places of some Mycenaean pictorial vessels: the contribution of

Chemical Pottery Analysis', *OpAth* 25–6 (2000–1), 95–106).

<sup>78</sup> The LH III A2–B transition among others at Tiryns is portrayed in a chart published in 1988. The chart shows a sudden decrease in III A2 pottery at a point around 1300 B.C., but the calendar date is of course based on Egyptian contexts (K. Kilian, 'Mycenaeans up to date, trends and changes in recent research', in French–Wardle (n. 7), 115–52).

<sup>79</sup> Hallager (n. 14) and Warren comment therein.

<sup>80</sup> J. Phillips. 'And then there were none – Egypt and Crete in the 13th c. BC', paper presented at 'From Crete and Mycenae to Amarna: Pots, Pictures and Places in the Work of Vronwy Hankey', Institute of Archaeology, University College London, 25 May 2002.

<sup>81</sup> Evans (n. 57).

<sup>82</sup> Phillips (n. 80).