

“Minding the Gap”

Gaps, Destructions, and Migrations in the Early Bronze Age Aegean: Causes and Consequences

MALCOLM H. WIENER

Abstract

The upheavals and transformations in Greece and the Cyclades during the late third millennium B.C.E. must be considered in the light of related events throughout the eastern Mediterranean, as well as in regions farther east and west. The prolonged desiccation event between ca. 2300 and 2000 B.C.E., for which there is extensive evidence in the Near East and Egypt (and perhaps a far wider region), is explored together with the potential impact of roughly contemporaneous developments including migrations, the displacement of trading networks, warfare, new weapons technologies, and the appearance of sailing vessels in the Mediterranean.*

PROPOSED CLIMATE EVENTS, ABANDONMENTS, DESTRUCTIONS, AND MIGRATIONS IN THE NEAR EAST AND EGYPT AT THE CLOSE OF THE EARLY BRONZE AGE

This article considers developments in the Cyclades and continental Greece in Early Bronze (EB) II and III in relation to the course of events in Anatolia, the Khabur River basin, the Levant, Canaan, Cyprus, Egypt, Crete, Malta, and Spain. I begin with the asserted evidence for prolonged severe drought (and/or soil erosion) between ca. 2300 and 2000 B.C.E. in many of these areas and its consequences. The generality, degree of impact, geographic scope, and ultimate cause or causes of the climate event are matters of continu-

ing discussion.¹ Some climatologists, concentrating on evidence from the Near East, believe that the moisture-laden North Atlantic cyclonic westerlies, which seasonally break into the Mediterranean trough and provide the winter precipitation needed for dry farming, failed for reasons still unknown and that 250 years later precipitation, carried by westerlies, returned the area to pre-aridification levels.² Some recent studies suggest an even broader Northern Hemisphere-wide megadrought event at 4.2 ka b.p.³ extending to a far wider area and possibly involving a change in solar irradiance or a succession of major volcanic eruptions. Others, however, have questioned the existence of a pervasive or continuing climate event anywhere.⁴

The pattern of change in western Asia beginning 2300–2250 B.C.E. was clearly uneven, with the impact and chronology differing between areas.⁵ Weiss states the proposed Near Eastern climate event in maximum terms—“societies responded to the abrupt climate change with political collapse, regional abandonment, nomadization, and habitat-tracking to sustainable agricultural regions”—a view rejected by Koliński, who cites recent evidence from excavations to indicate that the effect in the Khabur Valley was neither so general nor so closely correlated in time.⁶ Of course, critical thresholds may be breached in some regions at certain times and not in others. The amount of social storage

*It is a pleasure and a privilege to participate in this Forum in honor of Jerry Rutter, particularly inasmuch as I have been the grateful recipient of “Jerrygrams” containing incisive comments on drafts of papers, including in particular this article, to which he has provided additional citations and clarifying suggestions. I am also grateful to my fellow contributors; the anonymous reviewers for the *AJA*; Cyprian Broodbank, Joseph Maran, and Peter Warren for many helpful comments; and Jayne Warner, Erin Hayes, Jason Earle, and Rebecca Hahn for research assistance and editorial advice. I hope that readers will also join the discussion on the *AJA* website (www.ajaonline.org).

¹Weiss et al. 1993; Dalfes et al. 1997; Cullen et al. 2000; Finné and Holmgren 2010, 48–9; Finné et al. 2011; Rapp and Jing 2011, 125; Butzer 2012, 3633–34; Weiss 2012a.

²Weiss 2012b.

³E.g., Triantaphyllou et al. 2009.

⁴Koliński 2007; Middleton 2012.

⁵Riehl et al. 2008; Riehl 2009.

⁶Koliński 2007; Weiss (forthcoming). Ur (2010a, 157) and Middleton (2012) are also cautious with respect to the dramatic nature and geographic scale of a climate event. See also Wilkinson (1994) with regard to his Brittle Economy Model.

available from prior years and the area over which stocks are shared are also relevant factors. Overall, areas dependent on rainfall or variable streams appear to have been severely impacted, while the number of sites and the population along the banks of major rivers (or perhaps in some cases in areas of marsh or adequate springwater) may have increased in this period.⁷ In particular, the cessation of major grain imports may have been critical with regard to the demise of the Akkadian empire. Of course, a major desiccation event, even in one critical area, that sets a population in motion and interrupts a trade network for essential imports can produce cascading effects. Network theory teaches that the more interconnected the whole, the more likely that local losses will be repaired when they occur, until the time when a critical stress level is reached, at which point the entire system will collapse.⁸

Whatever the role of climate change in the Khabur Valley, the closing centuries of the third millennium B.C.E. witnessed major dislocations in many areas. In Anatolia, the arc of destruction included Troy, where the great walls of Troy II–III fell into ruin and Troy IV suffered six destruction levels. The inhabited area shrank drastically; surrounding smaller sites disappeared along with evidence of external contacts; and signs of stress on barley crops appeared. Faunal remains indicate an altered diet containing a significant percentage of deer and other nondomesticates.⁹ Sites in Cilicia and the central Taurus mountain range (such as the major metallurgical site of the Kestel mines and the adjacent 65 ha site of Göltepe located 80 km north of Tarsus)¹⁰ and to the east across the Taurus range at Kültepe were abandoned as well. In the Khabur Valley in northeastern Syria, many major Akkadian sites such as Tell Leilan were buried in dust and abandoned ca. 2250–2220 B.C.E. (fig. 1).¹¹ Many other Syrian sites were abandoned early in EB IVB, with the final wave of destruction and abandonment coming at the end of EB IVB in the late third millennium.¹² Some of the people set in motion headed south toward river land, to judge from texts report-

ing that a 180 km long wall called the Repeller of the Amorites was built across the center of Mesopotamia to limit nomadic incursions.¹³ Another long wall, known as the Très Long Mur, was built to protect “the new karstic-spring Orontes River urban refugia from ‘Amorite’ nomad incursions.”¹⁴ In Canaan, a decrease in rainfall beginning ca. 2300 B.C.E. and resulting in the creation of the wadis visible today has been proposed as the cause of the precipitous decline in the number of inhabited sites in EB III–IVB,¹⁵ including the hiatus posited at Ugarit.¹⁶ West of the Jordan and the Dead Sea, not a single site has been found that survived the collapse. A few sites survived in the stream-fed northern Levant.¹⁷ In Cyprus, the Philia phase of the Early Bronze Age, characterized by a uniformity of material culture indicating close connections between different parts of the island and linked to a broader eastern Mediterranean interaction sphere, broke down ca. 2200 B.C.E., perhaps responding to the general collapse of overseas systems rather than, or in addition to, climatic factors.¹⁸ In Egypt, the incidence of famine increased in the late 6th Dynasty as Nile levels fell, reaching a minimum ca. 2200 B.C.E.,¹⁹ as the Old Kingdom began its collapse into the chaos of the First Intermediate Period. The autobiography of Ankhthifi (a southern provincial governor of the 9th Dynasty ca. 2100 B.C.E.) inscribed on a rock-cut tomb reports starvation caused by Nile failure, dislocation, and the breakdown of order.²⁰

Greece in general receives more rain than the Near East or Egypt, but with local differences: in periods of dryness, the west-facing valleys of Achaea fare better than Laconia and Messenia, for example.²¹ There is some evidence for dryness in the Peloponnese and other parts of Greece in the late third millennium B.C.E. Major episodes of soil erosion are reported; proposed causes range from farming practices to catastrophic summer rains to climate change involving an absence of rain.²² The Lerna Early Helladic (EH) III deposit includes birds that can exist only in a climate significantly drier than the present climate.²³ Contem-

⁷Peltenburg 2007; Weiss (forthcoming).

⁸Scheffer et al. 2012. Perrow (1999) advances the hypothesis that the more complex and tightly coupled a system, the greater the risk of catastrophic collapse.

⁹Pavúk et al. (forthcoming).

¹⁰Yener 1995; see also Muhly 1993; Yener and Vandiver 1993a, 1993b.

¹¹Weiss et al. 1993.

¹²Porter 2007; Schwartz 2007, 52; Ur 2010b, 388, 412.

¹³deMenocal 2001, 669 (citing Weiss et al. 1993).

¹⁴Weiss 2012b, 13.

¹⁵Mazar 1990, 151–73; Falconer 1994; de Miroschedji 2009.

¹⁶Astour 2002, 165–66.

¹⁷de Miroschedji 2009.

¹⁸Frankel and Webb 2012, 1380 (citing Webb and Frankel 1999).

¹⁹Redford 1992, 61–2.

²⁰Butzer 2012, 3633.

²¹Regarding the Late Bronze Age, see, e.g., Carpenter 1966, 37, 63; O’Brien 2013, 15.

²²Van Andel et al. 1986, esp. 113; Maran 1998, 452–53; Weiberg and Finné 2013.

²³Gejvall 1969, 47–9, 55.

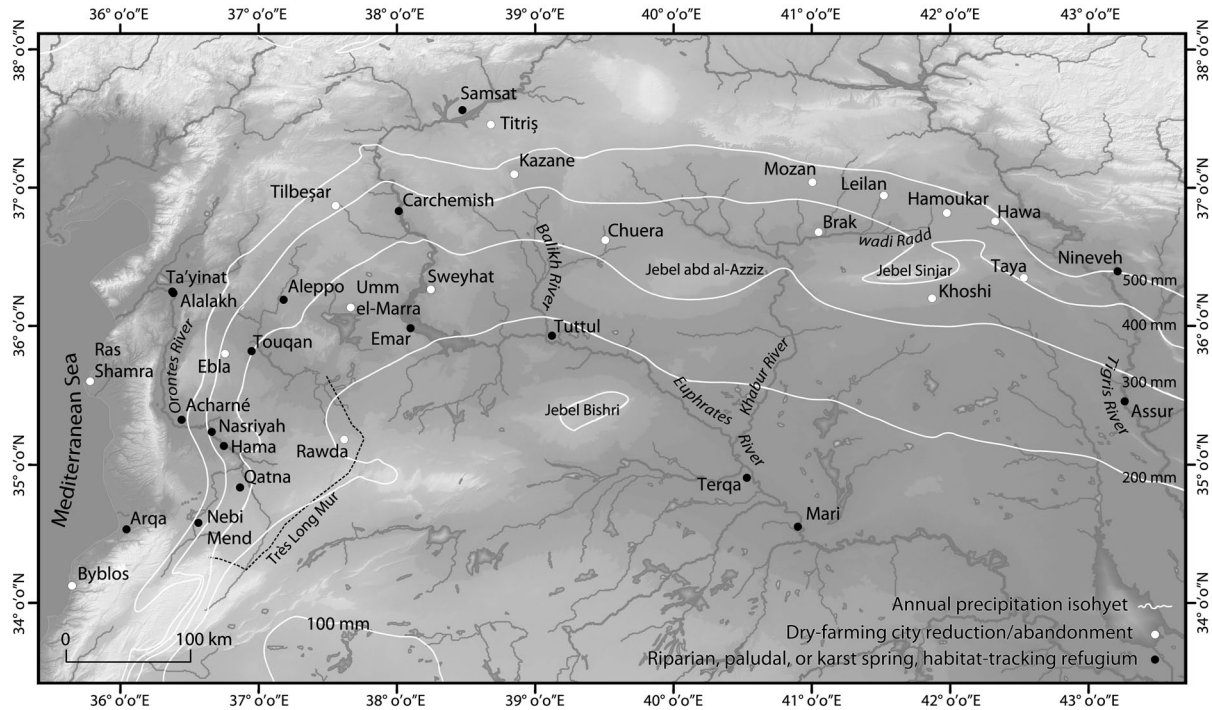


Fig. 1. Map of Syria and Mesopotamia, 4.2–3.9 ka b.p. (after Weiss 2012b, fig. 5; courtesy H. Weiss).

poraneous evidence from the Cyclades is lacking. The islands today suffer frequent water shortages with great interyear variability. Major differences exist between islands, but none is entirely water sufficient in the long run, as Broodbank and others have noted.²⁴ There is some evidence for water stress on Crete toward the end of the Early Minoan (EM) period,²⁵ particularly in the east of Crete, which witnessed many destructions in or at the end of EM II. In central Crete, the period from EM III to Middle Minoan (MM) IA appears to have been a time of considerable increase in social complexity.²⁶ Central Crete is better watered in general. The exception is the Mesara Plain to the east of the Phaistos palace, which may explain the rapid and intense Phaistian settlement of the abundantly watered Amari Valley to the north after the consolidation of palatial authority at the beginning of the Old Palace period ca. 1950 B.C.E. Throughout Crete today, interyear variation is high, with water availability dependent in good part both on the extent of the winter

snowfall and on whether melting comes gradually or in torrents. Such variability may have intensified the need for interyear social storage and for a more complex society. Whether mainland Greece, Crete, or the Cyclades were greatly affected directly by shortage of rain in EB III or suffered the secondary effects of climate disaster in lands to the east and south remains an open question.

It is worth noting that in EB I–II, prior to the postulated climate change event, the eastern shore of the Aegean led the western shore in access to metal sources and trade networks, site size, fortification walls, and social complexity (e.g., Troy, Poliochni, Thermi, Panaztepe, Liman Tepe, Miletos, Bakla Tepe). Kouka notes that by ca. 3000 B.C.E. Liman Tepe already had long houses containing gold and silver jewelry and, when reorganized in EB II, became a site of more than 20 ha with a huge bastion.²⁷ Moreover, the administrative use of seals and of common systems of weights over large areas began in the Near East and traveled

²⁴ Van Andel et al. 1986, esp. 113; Broodbank 2000, 77–8; Wilson 2008, 98.

²⁵ The evidence is summarized by Moody (2009, 244), who concludes that “summer evaporation soars to an interglacial

high between ca. 2200–2000 B.C.”; see also Bottema and Sarpaki 2003.

²⁶ Watrous 2004, 266–67.

²⁷ Kouka 2013.

west.²⁸ (A recent claim that “the northeastern Peloponnese appears to have been at the forefront of development in the Aegean”²⁹ in EB II clearly applies only to the western shore of the Aegean and the Cyclades.) During EB I–II, Cycladic islanders in their longboats surely played a vital role in the transmission of goods, knowledge, and beliefs from east to west across the Aegean. The presence in the Cyclades in EB II of seals and sealings,³⁰ as well as of weights consistent with systems employed first in the Near East and along the eastern shore of the Aegean and then in Greece in EB II, was a manifestation of this role.³¹ We should, however, recognize as well the early Cretan prominence in metallurgy, perhaps beginning in EB I as suggested with respect to the metallurgical installation at the site of Chrysokamino.³²

DESTRUCTIONS, ABANDONMENTS, AND
MIGRATIONS IN MAINLAND GREECE, THE
CYCLADES, CRETE, MALTA, AND SPAIN:
CAUSES AND CONSEQUENCES

I turn now to the destructions and abandonments in continental Greece and the Cyclades in EB III. In the Aegean, the so-called International Age of EB II was followed by a period of turmoil.³³ On the Greek mainland, the massive Rundbau granary at Tiryns and the substantial corridor houses at various sites, including the House of the Tiles at Lerna and the Weißes Haus at Kolonna on Aegina, were destroyed. The construction of the corridor houses ended, along with the pre-state sealing-administration systems of Lerna and Geraki in Laconia.³⁴ By the Middle Helladic/Middle Cycladic period, evidence of seals and sealings disappeared, metallurgy declined, and luxury goods practically disappeared.³⁵ In the Cyclades, the manufacture of marble objects ceased or sharply declined, and cist tomb burial ended.³⁶ Fortifications were created on hilltops, apparently for the purpose of protecting food supplies and people for limited periods in expectation of raids—for example, at Kastri on Syros and Panormos on Naxos. At Panormos, the end was surely

violent, to judge from the facts that the entrance was burnt and sling stones and a spearhead were found in the debris.³⁷ Many Cycladic sites were abandoned, including the putative pan-Cycladic ritual center of Dhaskalio Kavos on Keros.³⁸ Cycladic material ceased to appear at Helladic sites. The arc of upheaval extended farther west as well, for the temple culture of Malta and the metallurgical culture of Rio Tinto in Spain ended ca. 2000 B.C.E.³⁹ It is worth noting that the direction of regional abandonments appears to have moved from east to west over time, beginning in the Khabur River valley early in the 23rd century B.C.E.

On Crete, Cycladic-type burials and funerary assemblages, so clearly evident at Ayia Photia, Gourmes, and Poros in EM I, beginning in EM II, along with locally made Cycladic-type pottery, were replaced in part by imports from the Cyclades. Jars from the metalliferous islands of Melos, Siphnos, and Kea are prominent among the assemblages.⁴⁰ The acquisition of metals was surely of prime importance to Minoans on Crete, who may have undertaken the requisite voyages. Brogan observes that four boat models were present in the excavated material from EM II Mochlos and suggests that the evident wealth present, including imported gold objects, may reflect local maritime capabilities.⁴¹ West Crete exhibits a different pattern. There is little evidence of direct contact with either the rest of Crete or the Cyclades. Instead, along with pottery of the local tradition, there appeared in EM IIA a locally made black-slipped ware of Helladic-Cycladic shapes, including sauceboats. The island of Kythera with its west Cretan-type settlement is a likely point of transmission. By EM IIB, such pottery no longer appeared in west Crete.⁴²

Crete, and in particular the northeast coast, was not exempt from disturbance in EM IIB, as shown by the destruction at Mochlos (unexpected by the inhabitants, it would seem),⁴³ the massive perimeter walls erected at various sites in EM III, and the likely construction of harbor fortification walls at Malia at this time.⁴⁴ Central Crete does not appear to have been

²⁸ Rahmstorf 2006a, 2006b, 2011.

²⁹ Weiberg and Finné 2013, 22.

³⁰ Zachos and Dousougli 2008, esp. 93–4; Georgiadis 2012, 188.

³¹ Rahmstorf (2003) suggests further that the weights were principally employed in connection with cultural exchanges of metals.

³² Betancourt 2006.

³³ Forsén 1992, 204–20, 255–56.

³⁴ Tiryns: Kilian 1986. Lerna: Dickinson 1994, 189; Wiencke 2000, 652–53. Geraki: Weingarten et al. 2011. Sealing use ended as well at the 10 or more other sites on the mainland and in the Cyclades, where sealings have been found in EH/Early

Cycladic II–III contexts (Rahmstorf 2003, 296).

³⁵ Snodgrass 1971, 383–86; 2006; Philippa-Touchais 2011.

³⁶ Broodbank 2000, 177–78, 322.

³⁷ Doumas 1992; Angelopoulou 2003, 2008.

³⁸ Renfrew et al. 2009, 2012.

³⁹ Amzallag 2009, 509; Broodbank 2013.

⁴⁰ Brogan 2013.

⁴¹ Soles 2012; Brogan 2013.

⁴² Nodarou 2011.

⁴³ Brogan 2013.

⁴⁴ Watrous 2004, 255; Watrous and Hadzi-Vallianou 2004, 445.

greatly affected, however, and by EM III seems to have been well on the way toward palace-centered polities in the process of state formation,⁴⁵ as indicated by the large-scale construction activity and the appearance of exotic foreign imports at Knossos, Archanes, Malia, and Phaistos. Todaro describes the “re-organization of the Phaistos hill at the beginning of the EM III period, in the course of a large building project that marked the beginning of the palatial phenomenon in south central Crete.”⁴⁶

Beginning in EB II in the northern Cyclades and central Greece and continuing into EB III as far as Aegina and the southern Cyclades, metal forms and burnished pottery of western Anatolian type, the infamous Kastri Group, appeared, often in significant quantities.⁴⁷ Crete, however, was largely exempt from these developments, with only one teapot and a few sherds reported to date.⁴⁸ On the now-deserted island of Christiana (the closest of the Cyclades to Crete), however, Kastri Group *depas* handles and other sherds were visible on the surface of a saddle between two hills when several colleagues and I climbed to the location in 1998.⁴⁹

The boundary between the Cyclades and Crete marks an abrupt limit to the distribution of Kastri Group pottery and metallurgy. Pottery of the Phylakopi I type is also known from Christiana but is infrequent on Crete, again indicating a line of demarcation. Eastern Adriatic Cetina culture objects that appeared in mainland Greece at this time are also absent from Crete.⁵⁰ Indeed, the first appearance of monumentality and literacy in the Aegean was on Crete in EM III–MM I and may have resulted from the fortunate position of Crete, distant enough from the turmoil in Anatolia, the Cyclades, and mainland Greece and sufficient in population relative to size to resist destructive incursions but close enough to receive stimuli from the civilizations of Egypt and the Near East.

Fifty years ago, when I first began to study the Aegean Bronze Age, it was the general belief that the EB III period marked the arrival of a new people—indeed, the coming of the Greeks.⁵¹ Today, the prevailing view is different, in part because excavations in the intervening years have shown that the appearance of Kastri

Group pottery and Anatolian metal forms preceded the destructions and in part because of the absence of an overall pattern, geographical or chronological, in the last half of the third millennium B.C.E. in mainland Greece and the Cyclades. Destructions occurred at both the beginning and end of EH III. In some cases, destructions were followed by gaps of centuries—one thinks, for example, of Ayia Irini on Kea (Rutter’s prime example), Tsoungiza in the Nemea Valley, Aegion on the north coast of Achaia, or Geraki in Laconia, which was abandoned after a fierce fire in EH IIB.⁵² Almost no EH III pottery has been identified from Laconia.⁵³ At Lerna, the destruction of the House of the Tiles appears to have been followed by immediate reoccupation of the site, but of a different nature, while at Thebes, Orchomenos, and Eutresis in Boeotia and at Tiryns in the Argolid, there is no apparent break in occupation but rather evidence of site reorganization. Rutter has noted, however, that “the dramatic differences between the EH II and EH III repertoires of cooking pottery suggest that a shift in the manner of food preparation, possibly signaling a change in diet as well, may have been a facet of this cultural transition.”⁵⁴ Kolonna on Aegina is of special interest, for it appears to have received jewelry from the eastern Mediterranean on at least one occasion during EH III⁵⁵ and is the only major fortified site known in the early stages of the succeeding Middle Helladic period. Crego has proposed that colonists from Kolonna may have been responsible for the reoccupation of Ayia Irini on Kea in Period IVa.⁵⁶ Ships with armed men aboard are depicted on Aeginetan pottery.⁵⁷ Many of the destructions in the Cyclades and on the mainland may have been the results of attacks and sometimes occupation by other Cycladic islanders or mainlanders, in which Kolonna on the island of Aegina in the Saronic Gulf may have played a prominent role, apart from possible raids from Anatolia or movements from the Balkans. There can be no doubt that Greece (with the possible exception of Kolonna) suffered a severe recession in complexity and interconnectedness by the early Middle Helladic period or that the Cyclades experienced a wave of destructions, depopulations in some cases, and major

⁴⁵ Tomkins 2012.

⁴⁶ Todaro 2013.

⁴⁷ Broodbank 2000, 309–19; Choleva 2012; Pullen 2013.

⁴⁸ Davaras and Betancourt 2004, 231–32.

⁴⁹ See also Sotirakopoulou 1993, 16–17.

⁵⁰ Maran 1986, 1998; Rambach 2001, 2002, 2004.

⁵¹ Caskey 1960. Cf. Forsén 1992; Manning 1995; see also Rutter 2001a, 2001b; Pullen 2008.

⁵² Papazoglou-Manioudaki 2010, 131; Weingarten et al.

2011.

⁵³ Cavanagh and Mee 2011.

⁵⁴ Rutter 2001a, 116.

⁵⁵ Reinholdt 2008. I am indebted to Joseph Maran for this reference.

⁵⁶ Crego 2010, 843.

⁵⁷ Philippa-Touchais 2007, 108 (citing Siedentopf 1991, 24–5, pls. 35–8).

cultural change. Of course, some societies will always be more resourceful and resilient than others, qualities that may be displayed by local adaptation to new circumstances, by a willingness to migrate, and/or by resorting to warfare if necessary.⁵⁸

It is worth noting that in addition to Anatolian impulses, eastern Adriatic Cetina culture objects and influences appeared at Olympia and elsewhere in the Peloponnese with increasing frequency toward the end of EH III, suggesting the movement of people whose type-fossils appear in the central/western Mediterranean as well.⁵⁹ EH III also saw the first appearance of the horse in Greece.⁶⁰ Nomadic or seminomadic people may have arrived in Greece at this time.⁶¹ Barber, in her seminal book on prehistoric weaving, has pointed to changes in spindlewhorls and the virtual absence of terracotta loomweights in Thessaly and Boeotia at the time, noting that nomads typically did not carry bulky loomweights but used pieces of local rock instead.⁶² A Near Eastern text known as the Assyrian King List speaks of “the seventeen [Amorite] kings who lived in tents” prior to the rule of Shamshi-Adad.⁶³

CLIMATE IN CONTEXT: WARFARE, PIRACY,
TRADING NETWORK DISRUPTION, METALLURGY,
WEAPONRY, AND SEAFARING

Warfare and piracy have occurred frequently in the eastern Mediterranean throughout history without a propelling climate event, sometimes with devastating consequences (such as the abandonment of some of the Cyclades during the deprivations of Barbarossa). Migrations may occur for reasons apart from climate-induced water shortages and, whatever the cause, may or may not result in warfare. Migration and diffusion as explanations for major change have been out of fashion for half a century, but people, technologies, and ideas do move (as, e.g., the Hyksos). Piracy can occur, of course, when there are no food shortages, but it may receive further impetus when shortages exist. Braudel once observed that there is usually a surplus of grain somewhere in the Mediterranean—the problem is to find it and ship it.⁶⁴ If, however, the severity of climate change was as great as has been suggested, grain anywhere may have been difficult to find, thus stimulating more intense and sometimes violent searches.

Complicating the picture toward the close of the third millennium B.C.E. are the impact first of the spread of furnace smelting and subsequently the appearance of tin bronze on the number and nature of weapons; the disruption and reorganization of trading networks for metals, food, and/or prestige goods and accompanying relationships; and the coming of the age of sail. By Early Cycladic (EC)/EM I–early EC/EM II, a large dagger made of arsenical copper appeared at the Cycladic-style site of Ayia Photia on Crete.⁶⁵ Metal daggers are conspicuous in Cycladic graves from EC II.⁶⁶ Indeed, such daggers may have been worn not merely as possessions but also as symbols of status by warriors throughout much of the Mediterranean, in a period that also saw the appearance, first in western Anatolia, of the firmly hafted slotted spearhead and the widespread construction of defensive circuits with bastions.⁶⁷ The diffusion of furnace smelting may have played a critical role. The fortified sites around the Rio Tinto in Spain, which appeared suddenly at the beginning of the third millennium and disappeared equally suddenly at its end, were probably centers of furnace smelting.⁶⁸ By EB II, tin bronze, capable of producing better and more easily cast weapons, was in use at Troy, and it appeared at Poliochni on Lemnos, Thermi on Lesbos, and Kastri on Syros by EC III. Weapons and other objects from Kastri are made from metal whose sources are in Anatolia.⁶⁹ Conflict resulting from the disruption of food supplies and fueled by increasing availability and/or improvement in weapons may have been more significant than food shortages in themselves in destabilizing societies.

Lastly, the impact of the transformation of seafaring in this period requires consideration. By at least the beginning of EC II, longboats capable of covering 20–50 km per day and carrying substantial loads of people, animals, and food—or of warriors—existed (fig. 2, top).⁷⁰ Nevertheless, the appearance of sailing vessels in the Aegean would surely have transformed the prospects for trade, raid, and settlement. Sails were apparently already in use by at least the fifth millennium B.C.E. in the Persian Gulf.⁷¹ A depiction of an Egyptian Nile boat under sail appeared in the late fourth millennium B.C.E.⁷² By the 26th century B.C.E., during the 4th Dynasty, substantial harbors that could

⁵⁸ Cf. Weiberg and Finné 2013.

⁵⁹ Rambach 2001, 2002, 2004.

⁶⁰ von den Driesch and Boessneck 1990; Banks 2013, 455.

⁶¹ Rutter 1988.

⁶² Barber 1991, 307–8; see also Carington Smith 1976, 218–39, 400–4; 1992, 690; Pavúk 2012, 124.

⁶³ Glassner 1993, 147.

⁶⁴ Braudel 1972, 570–76 (quoted in Dickinson 2010, 26).

⁶⁵ Muhly 2013.

⁶⁶ Sherratt 2007, 250.

⁶⁷ Broodbank 2000, 285; Branigan 2012, 8.

⁶⁸ Amzallag 2009, 509.

⁶⁹ Stos-Gale et al. 1984, 23, 30–6.

⁷⁰ Broodbank and Strasser 1991, 241; Broodbank 2000, 102, 260, 287; Maran 2008.

⁷¹ Carter 2006.

⁷² Broodbank 2010, 255.

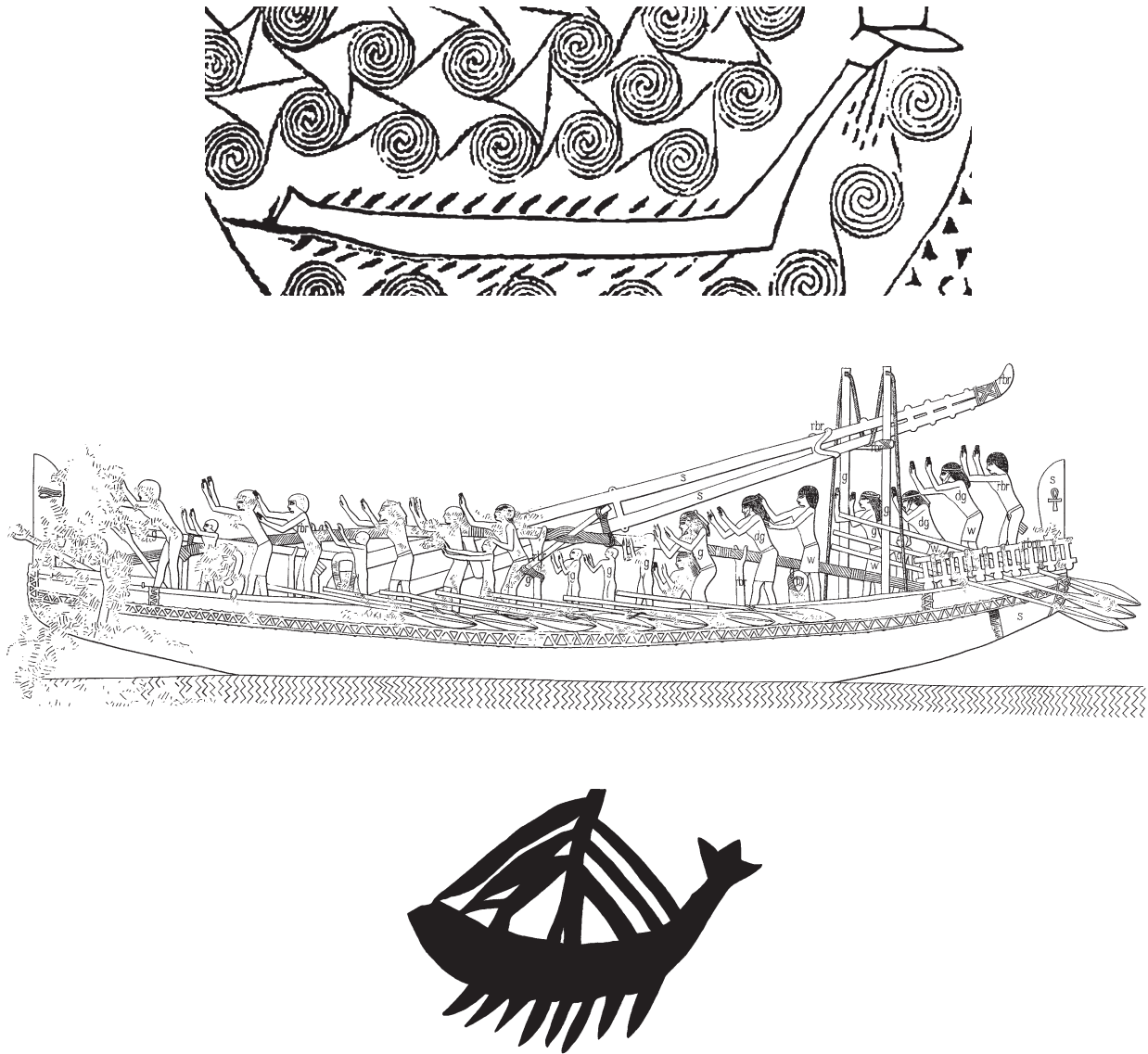


Fig. 2. Ships in the prehistoric Mediterranean: *top*, detail from an EC II “frying pan” depicting a longboat; *center*, sailing ship from the relief in the Temple of Sahure, 5th Dynasty (modified from Borchardt 1913, pl. 12); *bottom*, drawing of a MM I seal depicting a ship with sails and oars (Oxford, Ashmolean Museum, inv. no. AN1938.761).

serve sailing vessels were created on the Red Sea.⁷³ By the middle of the third millennium, seagoing sailing vessels were traveling from Egypt to Byblos.⁷⁴ The text known as the Annal Stone from the reign of Snofru (ca. 2575–2550 B.C.E.) describes 40 ships bringing wood from a foreign land and ships of 100 cubits (more than 50 m). The funerary boat from the pyramid of Khufu,

his predecessor, was made with approximately 38 tons of imported cedar.⁷⁵ Broodbank, citing the work of Wachsmann, notes that beginning in the early 25th century B.C.E. “monuments of the pharaohs . . . show large, developed ships with a bipod or tripod mast . . . a yard above and a boom below, and long oars” (see fig. 2, center).⁷⁶ Such ships may have brought newcomers

⁷³Tallet 2013.

⁷⁴Bietak 2010, esp. 142–43.

⁷⁵Mark 2009.

⁷⁶Broodbank 2010, 255; see also Wachsmann 1998, 13–14, figs. 2.2–8.

from Anatolia to Cyprus at the beginning of the Philia phase, ca. 2450–2400 B.C.E., and/or at the time of the breakdown of the Philia culture, ca. 2200 B.C.E.⁷⁷ The earliest description in human history of an amphibious attack comes from the Testament of Uni, ca. 2300 B.C.E. during the reign of the 6th Dynasty pharaoh Pepi I. Uni describes an Egyptian assault by sea on fortified Canaanite sites, most likely including Tell es-Sakan near Gaza, a key stop on the Byblos route. The site was later destroyed during the First Intermediate Period when the voyages to Byblos ceased.⁷⁸

Evidence of contact with Egypt and the Near East, beginning at Knossos (ivory tusk and stone vase fragments), Mochlos, and Tholos E at Phourni-Archanes in EM IIA and increasing greatly in the Mesara and at Archanes in EM III, surely suggests voyaging in the Aegean by sail.⁷⁹ It seems unlikely that Egyptian voyaging would have ended abruptly at Byblos. (It is also worth noting that the onset of long-distance voyaging may have brought Aegean populations into contact with pathogens to which they had no immunity. Third-millennium B.C.E. Near Eastern texts speak of the plague.)⁸⁰ Crete produces wood suitable for sea-going ships, and it seems highly likely that Minoans would have soon sought to master the technology of sailing. While the earliest context for a Minoan seal impression depicting a sailing vessel is probably MM I (see fig. 2, bottom),⁸¹ the image already depicts an advanced sailing technology,⁸² and of course the actual technology may have been more advanced than the carver knew or was able to depict.⁸³ Moreover, there is no way of knowing how soon after their first appearance sailing vessels became a part of the seal carvers' repertoire. Seal carvers may have continued with earlier motifs because of their putative apotropaic function or in order to indicate continuity of possession or authority. In addition, sailing vessels may have been depicted only after Cretans had acquired them and wished to convey that fact. Thus, their actual first use may have come earlier than their depiction on seals. Of course, such vessels may have engaged in both raid and trade. EM III/MM IA saw the first appearance of Minoan pottery at Lerna, Asine, Ayios Stephanos, and Aegina. The line dividing Crete from the Cyclades and the mainland with respect to the Kastri and Phylakopi I material already noted continued into the second millennium B.C.E. with respect to Aeginetan Ware,

which appeared widely on the mainland in the Middle Helladic but was absent from Crete—not a single sherd has been reported from Knossos or Malia, for example, whereas Minoan pottery appears in the Cyclades and, as noted, along the eastern coast of the Peloponnese.

CONCLUSIONS

The late third-millennium B.C.E. pattern is familiar: voyagers came first to trade, then to raid, and in some cases, to settle, not always peacefully. A climate event may have provided a major impetus to the process, which also encompassed an expansion in numbers of arsenical copper daggers, the first appearance of tin bronze weapons, and the arrival of vessels under sail. There is still much to learn concerning the relative significance of these crucial factors and the nature of their interaction. One point is clear, however: disruptions and developments in Greece, the Cyclades, and the northeastern Aegean during the Early Bronze Age should not be analyzed solely in their local context, but rather should be considered in the light of events and developments of many kinds occurring in Anatolia, Cyprus, the Near East, Mesopotamia, the Levant, Canaan, Egypt, the Balkans, and the western Mediterranean. Moreover, both natural phenomena and human responses, and particularly the interaction between them, are central to our understanding of the history of humankind.

66 VISTA DRIVE
GREENWICH, CONNECTICUT 06830
MHWIENER@VILLACANDIA.COM

Works Cited

- Amzallag, N. 2009. "From Metallurgy to Bronze Age Civilizations: The Synthetic Theory." *AJA* 113(4):497–519.
- Angelopoulou, A. 2003. "Η 'Ομάδα Καστριού' και το Κορφάρι των Αμυγδαλιών (Πάνορμος) Νάξου." In *Αργοναύτης: Τιμητικός Τόμος για τον Καθηγητή Χρίστου Γ. Ντούμα. Από τους μαθητές του στο Πανεπιστήμιο Αθηνών (1980–2000)*, edited by A. Vlachopoulos and K. Birtacha, 159–90. Athens: Kathimerini.
- . 2008. "The 'Kastri Group': Evidence from Korfari ton Amygdalion (Panormos) Naxos, Dhaskalio Keros and Akrotiri Thera." In *Horizon: A Colloquium on the Prehistory of the Cyclades*, edited by N. Brodie, J. Doole, G. Gavalas, and C. Renfrew, 149–64. Cambridge: McDonald Institute for Archaeological Research.

⁷⁷ Kouka 2009, 36–40; Peltenburg 2013; Webb and Frankel 2013, 59.

⁷⁸ de Miroschedji 2012.

⁷⁹ Broodbank 2000, 341–49; Phillips 2008, 30–40 (Archanes), 78–82 (Knossos), 198–204 (Mochlos).

⁸⁰ McNeil 1976, 78–86.

⁸¹ Broodbank 2010.

⁸² Wedde 2000, 331–33.

⁸³ I thank Peter Kuniholm for this observation.

- Astour, M.C. 2002. "A Reconstruction of the History of Ebla (Part 2)." In *Eblaïtica: Essays on the Ebla Archives and Eblaïte Language*. Vol. 4, edited by C.H. Gordon and G.A. Rendsburg, 57–195. Winona Lake, Ind.: Eisenbrauns.
- Banks, E.C. 2013. *Lerna: A Preclassical Site in the Argolid. Results of Excavations Conducted by the American School of Classical Studies at Athens*. Vol. 6, *The Settlement and Architecture of Lerna IV*. Princeton: American School of Classical Studies at Athens.
- Barber, E.J.W. 1991. *Prehistoric Textiles: The Development of Cloth in the Neolithic and Bronze Ages*. Princeton: Princeton University Press.
- Betancourt, P.P. 2006. *The Chrysokamino Metallurgy Workshop and Its Territory*. *Hesperia* Suppl. 36. Princeton: American School of Classical Studies at Athens.
- Bietak, M. 2010. "From Where Came the Hyksos and Where Did They Go?" In *The Second Intermediate Period (Thirteenth–Seventeenth Dynasties): Current Research, Future Prospects*, edited by M. Marée, 139–81. *Orientalia Lovaniensia Analecta* 192. Leuven: Peeters.
- Borchardt, L. 1913. *Das Grabdenkmal des Königs S'ahu-Re*. Vol. 2, *Die Wandbilder*. *WDOG* 26. Leipzig: J.C. Hinrichs.
- Bottema, S., and A. Sarpaki. 2003. "Environmental Change in Crete: A 9000-Year Record of Holocene Vegetation History and the Effect of the Santorini Eruption." *The Holocene* 13:733–49.
- Branigan, K. 2012. "The Genesis of the Early Minoan Tholos Tomb." In *Philistor: Studies in Honor of Costis Davaras*, edited by E. Mantzourani and P.P. Betancourt, 7–14. *Prehistory Monographs* 36. Philadelphia: INSTAP Academic Press.
- Braudel, F. 1972. *The Mediterranean and the Mediterranean World in the Age of Philip II*. Translated by S. Reynolds. New York: Harper and Row.
- Brogan, T.M. 2013. "'Minding the Gap': Reexamining the Early Cycladic III 'Gap' from the Perspective of Crete. A Regional Approach to Relative Chronology, Networks, and Complexity in the Late Prepalatial Period." *AJA* 117(4):555–67.
- Broodbank, C. 2000. *An Island Archaeology of the Early Cyclades*. Cambridge: Cambridge University Press.
- . 2010. "'Ships A-sail from over the Rim of the Sea': Voyaging, Sailing and the Making of Mediterranean Societies c. 3500–800 BC." In *The Global Origins of Seafaring*, edited by A. Anderson, J.H. Barrett, and K. Boyle, 249–64. Cambridge: McDonald Institute for Archaeological Research.
- . 2013. "'Minding the Gap': Thinking About Change in Early Cycladic Island Societies from a Comparative Perspective." *AJA* 117(4):535–43.
- Broodbank, C., and T.F. Strasser. 1991. "Migrant Farmers and the Neolithic Colonization of Crete." *Antiquity* 65:233–45.
- Butzer, K.W. 2012. "Collapse, Environment, and Society." *Proceedings of the National Academy of Science* 109:3632–39.
- Carington Smith, J. 1976. "Spinning, Weaving and Textile Manufacture in Prehistoric Greece." Ph.D. diss., University of Tasmania.
- . 1992. "Spinning and Weaving Equipment." In *Excavations at Nichoria in Southwest Greece*. Vol. 2, *The Bronze Age Occupation*, edited by W.A. MacDonald and N.C. Wilkie, 674–711. Minneapolis: University of Minnesota Press.
- Carpenter, R. 1966. *Discontinuity in Greek Civilization*. Cambridge: Cambridge University Press.
- Carter, R. 2006. "Boat Remains and Maritime Trade in the Persian Gulf in the Sixth and Fifth Millennia BC." *Antiquity* 80:52–63.
- Caskey, J.L. 1960. "The Early Helladic Period in the Argolid." *Hesperia* 29:285–303.
- Cavanagh, W., and C. Mee. 2011. "Minding the Gaps in Early Helladic Laconia." In *Our Cups Are Full: Pottery and Society in the Aegean Bronze Age. Papers Presented to Jeremy B. Rutter on the Occasion of His 65th Birthday*, edited by W. Gauss, M. Lindblom, R.A.K. Smith, and J.C. Wright, 40–50. Oxford: Archaeopress.
- Choleva, M. 2012. "The First Wheelmade Pottery at Lerna: Wheel-Thrown or Wheel-Fashioned?" *Hesperia* 81:343–81.
- Crego, D.M. 2010. "Ayia Irini IV: A Distribution Center for the Middle Helladic World?" In *Mesohelladika: The Greek Mainland in the Middle Bronze Age*, edited by A. Philippa-Touchais, G. Touchais, S. Voutsaki, and J. Wright, 841–45. *BCH* Suppl. 52. Athens: École Française d'Athènes.
- Cullen, H.M., P.B. deMenocal, S. Hemming, G. Hemming, F.H. Brown, T. Guilderson, and F. Sirocko. 2000. "Climate Change and the Collapse of the Akkadian Empire: Evidence from the Deep Sea." *Geology* 28:379–82.
- Dalfes, H.N., G. Kukla, and H. Weiss, eds. 1997. *Third Millennium BC Climate Change and Old World Collapse*. NATO Advanced Science Institute Series I (49). Berlin: Springer.
- Davaras, C., and P.P. Betancourt. 2004. *The Hagia Photia Cemetery*. Vol. 1, *The Tomb Groups and Architecture*. *Prehistory Monographs* 14. Philadelphia: INSTAP Academic Press.
- deMenocal, P.B. 2001. "Cultural Responses to Climate Change During the Late Holocene." *Science* 292:667–73.
- de Miroschedji, P. 2009. "Rise and Collapse in the Southern Levant in the Early Bronze Age." *ScAnt* 15:101–29.
- . 2012. "Egypt and Southern Canaan in the Third Millennium BCE: Uni's Asiatic Campaigns Revisited." In *All the Wisdom of the East: Studies in Near Eastern Archaeology and History in Honor of Eliezer D. Oren*, edited by M. Gruber, S. Ahituv, G. Lehmann, and Z. Talshir, 265–92. *Orbis Biblicus et Orientalis* 255. Fribourg and Göttingen: Academic Press Fribourg and Ruprecht.
- Dickinson, O. 1994. *The Aegean Bronze Age*. Cambridge: Cambridge University Press.
- . 2010. "The 'Third World' of the Aegean? Middle Helladic Greece Revisited." In *Mesohelladika: The Greek Mainland in the Middle Bronze Age*, edited by A. Philippa-Touchais, G. Touchais, S. Voutsaki, and J. Wright, 13–27. *BCH* Suppl. 52. Athens: École Française d'Athènes.
- Doumas, C. 1992. "An Early Cycladic 'Hooked-Tang' Spearhead from Naxos." In *Studies in Honour of Vassos Karageorghis*, edited by G.C. Ioannides, 67–8. Kupriakai Spoudai 54–55. Nicosia: Society of Cypriot Studies.
- Falconer, S. 1994. "Village Economy and Society in the Jordan Valley: A Study of Bronze Age Rural Complexity." In *Archaeological Views from the Countryside: Village Communities in Early Complex Societies*, edited by G. Schwartz and S. Falconer, 121–42. Washington, D.C.: Smithsonian Institution Press.
- Finné, M., and K. Holmgren. 2010. "Climate Variability in the Eastern Mediterranean and the Middle East During the Holocene." In *The Urban Mind: Cultural and Environmental Dynamics*, edited by P.J.J. Sinclair, G. Nordquist, F. Herschend, and C. Isendahl, 29–60. *Studies in Global Archaeology* 15. Uppsala: African and Comparative Archaeology, Department of Archaeology and Ancient History, Uppsala University.
- Finné, M., K. Holmgren, H.S. Sundqvist, E. Weiberg, and M. Lindblom. 2011. "Climate in the Eastern Mediterranean,

- and Adjacent Regions, During the Past 6000 Years—A Review.” *JAS* 38:3153–73.
- Forsén, J. 1992. *The Twilight of the Early Helladics: A Study of the Disturbances in East-Central and Southern Greece Towards the End of the Early Bronze Age*. SIMA-PB 116. Jönsered: Paul Åströms Förlag.
- Frankel, D., and J.M. Webb. 2012. “Pottery Production and Distribution in Prehistoric Bronze Age Cyprus: An Application of pXRF Analysis.” *JAS* 39:1380–87.
- Gejvall, N.-G. 1969. *Lerna: A Preclassical Site in the Argolid. Results of the Excavations Conducted by the American School of Classical Studies at Athens*. Vol. 1, *The Fauna*. Princeton: American School of Classical Studies at Athens.
- Georgiadis, M. 2012. *Kos in the Neolithic and Early Bronze Age: The Halasarna Finds and the Aegean Settlement Pattern*. Prehistory Monographs 38. Philadelphia: INSTAP Academic Press.
- Glassner, J.-J. 1993. *Chroniques mésopotamiennes*. Roue à Livres 19. Paris: Les Belles Lettres.
- Kilian, K. 1986. “The Circular Building at Tiryns.” In *Early Helladic Architecture and Urbanization: Proceedings of a Seminar Held at the Swedish Institute at Athens, June 8, 1985*, edited by R. Hägg and D. Konsola, 65–71. SIMA 76. Göteborg: Paul Åströms Förlag.
- Koliński, R. 2007. “The Upper Khabur Region in the Second Part of the Third Millennium BC.” *Altorientalische Forschungen* 34:342–69.
- Kouka, O. 2009. “Cross-Cultural Links and Elite Identities: The Eastern Aegean/Western Anatolia and Cyprus from the Early Third Millennium Through the Early Second Millennium BC.” In *Cyprus and the East Aegean: Intercultural Contacts from 3000 to 500 BC. An International Archaeological Symposium Held at Pythagoreion, Samos, October 17th–18th 2008*, edited by V. Karageorghis and O. Kouka, 31–47. Nicosia: A.G. Leventis Foundation.
- . 2013. “‘Minding the Gap’: Against the Gaps. The Early Bronze Age and the Transition to the Middle Bronze Age in the Northern and Eastern Aegean/Western Anatolia.” *AJA* 117(4):569–80.
- Manning, S.W. 1995. *The Absolute Chronology of the Aegean Early Bronze Age: Archaeology, Radiocarbon and History*. Monographs in Mediterranean Archaeology 1. Sheffield: Sheffield Academic Press.
- Maran, J. 1986. “Überlegungen zur Abkunft der FH III-zeitlichen ritz- und einstichverzierten Keramik.” *Hydra* 2:1–28.
- . 1998. *Kulturwandel auf dem griechischen Festland und den Kykladen im späten 3. Jahrtausend v. Chr.: Studien zu den kulturellen Verhältnissen in Südosteuropa und dem zentralen sowie östlichen Mittelmeerraum in der späten Kupfer- und frühen Bronzezeit*. Bonn: Rudolf Habelt.
- . 2008, 21 May. “Seaborne Contacts Between the Aegean, the Balkans and the Central Mediterranean in the 3rd Millennium BC—The Unfolding of the Mediterranean World.” *Aegeo-Balkan Prehistory*. www.aegeobalkanprehistory.net/article.php?id_art=13.
- Mark, S. 2009. “The Construction of the Khufu I Vessel (c.2566 BC): A Re-evaluation.” *IJNA* 38:133–52.
- Mazar, A. 1990. *Archaeology of the Land of the Bible*. New York: Doubleday.
- McNeil, W. 1976. *Plagues and Peoples*. New York: Anchor Books.
- Middleton, G.D. 2012. “Nothing Lasts Forever: Environmental Discourses on the Collapse of Past Societies.” *JAS* 20:257–307.
- Moody, J. 2009. “Environmental Change and Minoan Sacred Landscapes.” In *Archaeologies of Cult: Essays on Ritual and Cult in Crete in Honor of Geraldine C. Gesell*, edited by A.L. D’Agata and A. Van de Moortel, 241–49. *Hesperia* Suppl. 42. Princeton: American School of Classical Studies at Athens.
- Muhly, J.D. 1993. “Early Bronze Age Tin and the Taurus.” *AJA* 97(2):239–53.
- . 2013. “Eastern Mediterranean Metallurgy in the Final Neolithic/Late Chalcolithic: Crete Enters the International World.” Paper read at the 114th Annual Meeting of the Archaeological Institute of America, 3–6 January, Seattle.
- Nodarou, E. 2011. *Pottery Production, Distribution and Consumption in Early Minoan West Crete: An Analytical Perspective*. BAR-IS 2210. Oxford: Archaeopress.
- O’Brien, S. 2013. “Parables of Decline: Popular Fears and the Use of Crises in Aegean Archaeological Interpretation.” In *Tough Times: The Archaeology of Crisis and Recovery. Proceedings of the Graduate Archaeology at Oxford Conferences in 2010 and 2011*, edited by E.M. van der Wilt and J. Martínez Jiménez, 13–22. BAR-IS 2478. Oxford: Archaeopress.
- Papazoglou-Manioudaki, L. 2010. “The Middle Helladic and Late Helladic I Periods at Aigion in Achaia.” In *Mesohelladika: The Greek Mainland in the Middle Bronze Age*, edited by A. Philippa-Touchais, G. Touchais, S. Voutsaki, and J. Wright, 129–41. *BCH* Suppl. 52. Athens: École Française d’Athènes.
- Pavúk, P. 2012. “Of Spools and Discoid Loom-Weights: Aegean-Type Weaving at Troy Revisited.” In *Kosmos: Jewellery, Adornment and Textiles in the Aegean Bronze Age. Proceedings of the 13th International Aegean Conference, University of Copenhagen, Danish National Research Foundation’s Centre for Textile Research, 21–26 April 2010*, edited by M.-L. Nosch and R. Laffineur, 121–30. *Aegaeum* 33. Leuven and Liège: Peeters.
- Pavúk, P., M. Pieniazek, and S. Riehl. Forthcoming. “Troy and the Troad in the 2nd Millennium: Changing Patterns of Landscape Use.” In *Physis: L’environnement naturel et la relation homme-milieu dans le monde égéen protohistorique. 14ème rencontre égéenne internationale, 11–14 décembre 2012, Paris*, edited by G. Touchais, R. Laffineur, S. Andreou, F. Rougemont, H. Procopiou, and E. Fouache. *Aegaeum*. Leuven and Liège: Peeters.
- Peltenburg, E. 2007. “Diverse Settlement Pattern Changes in the Middle Euphrates Valley in the Later Third Millennium B.C.: The Contribution of Jerablus Tahtani.” In *Sociétés humaines et changement climatique à la fin du troisième millénaire: Une crise a-t-elle eu lieu en haute Mésopotamie? Actes du Colloque de Lyon, 5–8 décembre 2005*, edited by C. Kuzucuoğlu and C. Marro, 247–66. *Varia Anatolica* 19. Istanbul: Institut Français d’Études Anatoliennes Georges-Dumézil.
- . 2013. “Chalcolithic Cyprus: Small-Scale Society in Transition.” Paper read at the International Conference “Communities in Transition: The Circum-Aegean Later Neolithic Stages (ca. 5000/4800–3200/3000 BC),” 7–9 June, Athens.
- Perrow, C. 1999. *Normal Accidents: Living with High-Risk Technologies*. Princeton: Princeton University Press.
- Philippa-Touchais, A. 2007. “Aeginetan Matt-Painted Pottery at Middle Helladic Aspis, Argos.” In *Middle Helladic Pottery and Synchronisms: Proceedings of the International Workshop Held at Salzburg, 31 October–2 November 2004*, edited by F. Felten, W. Gauss, and R. Smetana, 97–113.

- Ägina-Kolonna Forschungen und Ergebnisse 1. Vienna: Österreichische Akademie der Wissenschaften.
- . 2011. “Cycles of Collapse in Greek Prehistory”: Re-assessing Social Change at the Beginning of the Middle Helladic and the Early Iron Age.” In *The “Dark Ages” Revisited: Acts of an International Symposium in Memory of William D.E. Coulson, University of Thessaly, Volos, 14–17 June 2007*, edited by A. Mazarakis Ainian, 31–44. Volos: University of Thessaly Press.
- Phillips, J. 2008. *Aegyptiaca on the Island of Crete in Their Chronological Context: A Critical Review*. Vol. 2. Denkschriften der Gesamtakademie 49. Vienna: Österreichische Akademie der Wissenschaften.
- Porter, A. 2007. “You Say Potato, I Say . . . Typology, Chronology and the Origins of the Amorites.” In *Sociétés humaines et changement climatique à la fin du troisième millénaire: Une crise a-t-elle eu lieu en haute Mésopotamie? Actes du Colloque de Lyon, 5–8 décembre 2005*, edited by C. Kuzucuoğlu and C. Marro, 69–115. *Varia Anatolica* 19. Istanbul: Institut Français d’Études Anatoliennes Georges-Dumézil.
- Pullen, D. 2008. “The Early Bronze Age in Greece.” In *The Cambridge Companion to the Aegean Bronze Age*, edited by C.W. Shelmerdine, 19–46. Cambridge: Cambridge University Press.
- . 2013. “‘Minding the Gap’: Bridging the Gaps in Cultural Change Within the Early Bronze Age Aegean.” *AJA* 117(4):545–53.
- Rahmstorf, L. 2003. “The Identification of Early Helladic Weights and Their Wider Implications.” In *Metron: Measuring the Aegean Bronze Age. Proceedings of the 9th International Aegean Conference, New Haven, Yale University, 18–21 April 2002*, edited by K.P. Foster and R. Laffineur, 293–99. *Aegaeum* 24. Liège and Austin: Université de Liège and University of Texas at Austin.
- . 2006a. “In Search of the Earliest Balance Weights, Scales and Weighing Systems from the East Mediterranean, the Near and Middle East.” In *Weights in Context: Bronze Age Weighing Systems of the Eastern Mediterranean. Chronology, Typology, Material, and Archaeological Contexts. Proceedings of the International Colloquium, Roma, 22nd–24th November 2004*, edited by M.E. Alberti, E. Ascalone, and L. Peyronel, 9–45. *Studi e Materiali* 13. Rome: Istituto Italiano di Numismatica.
- . 2006b. “Zur Ausbreitung vorderasiatischer Innovationen in die frühbronzezeitliche Ägäis.” *PZ* 81:49–96.
- . 2011. “Re-integrating ‘Diffusion’: The Spread of Innovations Among the Neolithic and Bronze Age Societies of Europe and the Near East.” In *Interweaving Worlds: Systemic Interactions in Eurasia, 7th to 1st Millennia BC*, edited by T.C. Wilkinson, S. Sherratt, and J. Bennet, 100–19. Oxford: Oxbow.
- Rambach, J. 2001. “Bemerkungen zur Zeitstellung der Apsidenhäuser in der Altis von Olympia.” In *Lux Orientis: Archäologie zwischen Asien und Europa*, edited by R.M. Boehmer and J. Maran, 327–32. *Internationale Archäologie: Studia Honoraria* 12. Rahden: Marie Leidorf.
- . 2002. “Olympia: 2500 Jahre Vorgeschichte vor der Gründung des eisenzeitlichen griechischen Heiligtums.” In *Olympia 1875–2000: 125 Jahre Deutsche Ausgrabungen. Internationales Symposium, Berlin 9.–11. November 2000*, edited by H. Kyrieleis, 191–200. Mainz: Philipp von Zabern.
- . 2004. “Olympia im ausgehenden 3. Jahrtausend v. Chr.: Bindeglied zwischen zentralem und östlichem Mittelmeerraum.” In *Die Ägäische Frühzeit. 2. Serie: Forschungsbericht 1975–2002. Vol. 2, Die Frühbronzezeit in Griechenland mit Ausnahme von Kreta*, edited by E. Alram-Stern, 1199–242. Veröffentlichungen der Mykenischen Kommission 21. Vienna: Österreichische Akademie der Wissenschaften.
- Rapp, G., and Z. Jing. 2011. “Human–Environment Interactions in the Development of Early Chinese Civilization.” In *Human Interactions with the Geosphere: The Geoarchaeological Perspective*, edited by L. Wilson, 125–36. Geological Society Special Publications 352. London: The Geological Society of London.
- Redford, D.B. 1992. *Egypt, Canaan and Israel in Ancient Times*. Princeton: Princeton University Press.
- Reinholdt, C. 2008. *Der frühbronzezeitliche Schmuckhortfund von Kap Kolonna: Ägina und die Ägäis im Goldzeitalter des 3. Jahrtausends v. Chr.* Denkschriften der Gesamtakademie 46. Vienna: Österreichische Akademie der Wissenschaften.
- Renfrew, C., O. Philaniotou, N. Brodie, and G. Gavalas. 2009. “The Early Cycladic Settlement at Dhaskalio, Keros: Preliminary Report of the 2008 Excavation Season.” *BSA* 104:27–47.
- Renfrew, C., M. Boyd, and C. Bronk Ramsey. 2012. “The Oldest Maritime Sanctuary? Dating the Sanctuary at Keros and the Cycladic Early Bronze Age.” *Antiquity* 86: 144–60.
- Riehl, S. 2009. “Archaeobotanical Evidence for the Interrelationship of Agricultural Decision-Making and Climate Change in the Ancient Near East.” *Quaternary International* 197:93–114.
- Riehl, S., R. Bryson, and K. Pustovoytov. 2008. “Changing Growing Conditions for Crops During the Near Eastern Bronze Age (3000–1200 BC): The Stable Carbon Isotope Evidence.” *JAS* 35:1011–22.
- Rutter, J.B. 1988. “Early Helladic III Vasepainting, Ceramic Regionalism and the Influence of Basketry.” In *Problems in Greek Prehistory: Papers Presented at the Centenary Conference of the British School of Archaeology at Athens, Manchester April 1986*, edited by E.B. French and K.A. Wardle, 73–89. Bristol: Bristol Classical Press.
- . 2001a. “Review of Aegean Prehistory II: The Prepalatial Bronze Age of the Southern and Central Greek Mainland.” In *Aegean Prehistory: A Review*, edited by T. Cullen, 95–147. *AJA Suppl.* 1. Boston: Archaeological Institute of America. Originally published in *AJA* 97 (1993) 745–97.
- . 2001b. “Addendum: 1993–1999.” In *Aegean Prehistory: A Review*, edited by T. Cullen, 148–55. *AJA Suppl.* 1. Boston: Archaeological Institute of America.
- Scheffer, M. et al. 2012. “Anticipating Critical Transitions.” *Science* 338:344–48.
- Schwartz, G.M. 2007. “Taking the Long View on Collapse: A Syrian Perspective.” In *Sociétés humaines et changement climatique à la fin du troisième millénaire: Une crise a-t-elle eu lieu en haute Mésopotamie? Actes du Colloque de Lyon, 5–8 décembre 2005*, edited by C. Kuzucuoğlu and C. Marro, 45–68. *Varia Anatolica* 19. Istanbul: Institut Français d’Études Anatoliennes Georges-Dumézil.
- Sherratt, S. 2007. “The Archaeology of Metal Use in the Early Bronze Age Aegean: A Review.” In *Metallurgy in the Early Bronze Age Aegean*, edited by P.M. Day and R.C.P. Doonan, 245–63. *Sheffield Studies in Aegean Archaeology* 7. Oxford: Oxbow.
- Siedentopf, H.B. 1991. *Mattbemalte Keramik der mittleren Bronzezeit. Alt-Ägina* 4(2). Mainz: Philipp von Zabern.
- Snodgrass, A.M. 1971. *The Dark Age of Greece: An Archaeo-*

- logical Survey of the Eleventh to the Eighth Centuries BC.* Edinburgh: Edinburgh University Press.
- . 2006. "The Rejection of Mycenaean Culture and the Oriental Connection." In *Archaeology and the Emergence of Greece: Collected Papers 1965–2002*, 158–72. Ithaca, N.Y.: Cornell University Press.
- Soles, J.A. 2012. "Mochlos Boats." In *Philistor: Studies in Honor of Costis Davaras*, edited by E. Mantzourani and P.P. Betancourt, 187–99. Prehistory Monographs 36. Philadelphia: INSTAP Academic Press.
- Sotirakopoulou, P. 1993. "The Chronology of the Kastri Group Reconsidered." *BSA* 88:5–20.
- Stos-Gale, Z.A., N.H. Gale, and G.R. Gilmore. 1984. "Early Bronze Age Trojan Metal Sources and Anatolians in the Cyclades." *OJA* 3(3):23–43.
- Tallet, P. 2013. "The Wadi el-Jarf Site: A Harbor of Khufu on the Red Sea." *Journal of Ancient Egyptian Interconnections* 5:76–84.
- Todaro, S. 2013. "Phaistos and Ayia Triada in the Prepalatial Period: The Domestic, the Ritual and the Funerary Dimension." Paper read at the Minoan Seminar, 15 March, Athens.
- Tomkins, P. 2012. "Behind the Horizon: Reconsidering the Genesis and Function of the 'First Palace' at Knossos (Final Neolithic IV–Middle Minoan IB)." In *Back to the Beginning: Reassessing Social and Political Complexity on Crete During the Early and Middle Bronze Age*, edited by I. Schoep, P. Tomkins, and J. Driessen, 32–80. Oxford: Oxbow.
- Triantaphyllou, M.V. et al. 2009. "Late Glacial–Holocene Climate Variability at the South-Eastern Margin of the Aegean Sea." *Marine Geology* 266:182–97.
- Ur, J. 2010a. *Urbanism and Cultural Landscapes in Northeastern Syria: The Tell Hamoukar Survey 1999–2001*. OIP 137. Chicago: Oriental Institute of the University of Chicago.
- . 2010b. "Cycles of Civilization in Northern Mesopotamia." *Journal of Archaeological Research* 18:387–431.
- Van Andel, T.H., C.N. Runnels, and K.O. Pope. 1986. "Five Thousands Years of Land Use and Abuse in the Southern Argolid, Greece." *Hesperia* 55:103–28.
- von den Driesch, A., and J. Boessneck. 1990. "Die Tierreste von der mykenischen Burg Tiryns bei Nauplion/Peloponneses." In *Tiryns: Forschungen und Berichte*. Vol. 11, edited by H.-J. Weisshaar, I. Weber-Hiden, A. von den Driesch, J. Boessneck, A. Rieger, and W. Böser, 87–164. Mainz: Philipp von Zabern.
- Wachsmann, S. 1998. *Seagoing Ships and Seamanship in the Bronze Age Levant*. College Station: Texas A&M University Press.
- Watrous, L.V. 2004. "State Formation (Middle Minoan IA)." In *The Plain of Phaistos: Cycles of Social Complexity in the Mesara Region of Crete*, edited by L.V. Watrous, D. Hadzi-Vallianou, and H. Blitzer, 253–76. Monumenta Archaeologica 23. Los Angeles: Cotsen Institute of Archaeology, University of California.
- Watrous, L.V., and D. Hadzi-Vallianou. 2004. "Conclusions." In *The Plain of Phaistos: Cycles of Social Complexity in the Mesara Region of Crete*, edited by L.V. Watrous, D. Hadzi-Vallianou, and H. Blitzer, 443–49. Monumenta Archaeologica 23. Los Angeles: Cotsen Institute of Archaeology, University of California.
- Webb, J.M., and D. Frankel. 1999. "Characterizing the Philia Facies: Material Culture, Chronology, and the Origin of the Bronze Age in Cyprus." *AJA* 103(1):3–43.
- . 2013. "Cultural Regionalism and Divergent Social Trajectories in Early Bronze Age Cyprus." *AJA* 117(1):59–81.
- Wedde, M. 2000. *Towards a Hermeneutics of Aegean Bronze Age Ship Imagery*. Peleus: Studien zur Archäologie und Geschichte Griechenlands und Zyperns 6. Mannheim and Möhnese: Bibliopolis.
- Weiberg, E., and M. Finné. 2013. "Mind or Matter? People-Environment Interactions and the Demise of Early Helladic II Society in the Northeastern Peloponnese." *AJA* 117(1):1–31.
- Weingarten, J., S. Macveagh Thorne, M. Prent, and J.H. Crowel. 2011. "More Early Helladic Sealings from Geraki in Laconia, Greece." *OJA* 30:131–63.
- Weiss, H., ed. 2012a. *Seven Generations Since the Fall of Akkad*. Studia Chaburensia 3. Wiesbaden: Harrassowitz.
- . 2012b. "Quantifying Collapse: The Late Third Millennium Khabur Plains." In *Seven Generations Since the Fall of Akkad*, edited by H. Weiss, 1–24. Studia Chaburensia 3. Wiesbaden: Harrassowitz.
- . Forthcoming. "Altered Trajectories: The Intermediate Bronze Age in Syria and Lebanon 2200–1900 BCE." In *Oxford Handbook of the Archaeology of the Levant*, edited by A. Killebrew and M. Steiner. Oxford: Oxford University Press.
- Weiss, H., M.-A. Courty, W. Wellerstrom, F. Guichard, L. Senior, R. Meadow, and A. Currow. 1993. "The Genesis and Collapse of Third Millennium North Mesopotamian Civilization." *Science* 261:995–1004.
- Wiencke, M.H. 2000. *Lerna: A Preclassical Site in the Argolid. Results of Excavations Conducted by the American School of Classical Studies at Athens*. Vol. 4, *The Architecture, Stratification and Pottery of Lerna III*. Princeton: American School of Classical Studies at Athens.
- Wilkinson, T.J. 1994. "The Structure and Dynamics of Dry-Farming States in Upper Mesopotamia." *CurrAnthr* 35:483–520.
- Wilson, D. 2008. "Early Palatial Crete." In *The Cambridge Companion to the Aegean Bronze Age*, edited by C.W. Shelmerdine, 77–104. Cambridge: Cambridge University Press.
- Yener, K.A. 1995. "Early Bronze Age Tin Processing at Göltepe and Kestel, Turkey." In *Civilizations of the Ancient Near East*. Vol. 3, edited by J.M. Sasson, 1519–21. New York: Charles Scribner's Sons.
- Yener, K.A., and P.B. Vandiver. 1993a. "Tin Processing at Göltepe, an Early Bronze Age Site in Anatolia." *AJA* 97(2):207–38.
- . 1993b. "Reply to J.D. Muhly, 'Early Bronze Age Tin and the Taurus.'" *AJA* 97(2):255–64.
- Zachos, K., and A. Dousougli. 2008. "Observations on the Early Bronze Age Sealing from the Cave of Zas at Naxos." In *Horizon: A Colloquium on the Prehistory of the Cyclades*, edited by N. Brodie, J. Doole, G. Gavalas, and C. Renfrew, 85–95. McDonald Institute Monographs. Cambridge: McDonald Institute for Archaeological Research.