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The Sea Peoples, from Cuneiform Tablets to Carbon Dating

David Kaniewski1,2,3*, Elise Van Campo1,2, Karel Van Lerberghe4, Tom Boiy5, Klaas Vansteenhuyse6, Greta Jans6, Karin Nys5, Harvey Weis5, Christophe Morhange7, Thierry Otto1,2, Joachim Bretschneider4

1 EColab (Laboratoire d'Ecologie Fonctionnelle et Environnement), Université Paul Sabatier-Toulouse 3, Toulouse, France, 2 EColab Laboratoire d'Ecologie Fonctionnelle et Environnement, CNRS, Toulouse, France, 3 Center for Archaeological Sciences, Katholieke Universiteit Leuven, Heverlee, Belgium, 4 Near Eastern Studies, Faculté Lettres, Katholieke Universiteit Leuven, Leuven, Belgium, 5 Mediterranean Archaeological Research Institute, Vrije Universiteit Brussel, Brussels, Belgium, 6 Environmental Studies Program, Yale University, New Haven, Connecticut, United States of America, 7 CEREGE, UMR CNRS 6635, Aix-Marseille Université, Université de Provence, Europé de l’Ardèche, Aix-en-Provence, France

Abstract

The 13th century BC witnessed the zenith of the Aegean and Eastern Mediterranean civilizations which declined at the end of the Bronze Age, ~3200 years ago. Weakening of this ancient flourishing Mediterranean world shifted the political and economic centres of gravity away from the Levant towards Classical Greece and Rome, and led, in the long term, to the emergence of the modern western civilizations. Textual evidence from cuneiform tablets and Egyptian reliefs from the New Kingdom relate that seafaring tribes, the Sea Peoples, were the final catalyst that put the fall of cities and states in motion. However, the lack of a stratified radiocarbon-based archaeology for the Sea People event has led to a floating historical chronology derived from a variety of sources spanning dispersed areas. Here, we report a stratified radiocarbon-based archaeology with anchor points in ancient epigraphic-literary sources, Hittite-Levantine-Egyptian kings and astronomical observations to precisely date the Sea People event. By confronting historical and science-based archaeology, we establish an absolute age range of 1192–1190 BC for terminal destructions and cultural collapse in the northern Levant. This radiocarbon-based archaeology has far-reaching implications for the wider Mediterranean, where an elaborate network of international relations and commercial activities are intertwined with the history of civilizations.

Introduction

The late 13th century BC was a time of uncertainty and conflict for peoples and polities of the Aegean and Eastern Mediterranean [1,2,3]. Written evidences relate a weakening of central administrations [2], an erosion of political powers [4,5], and a widespread food shortage [6–8] underpinned by devastating drought [9,10]. This sequence of high-magnitude events led to the Sea People event and to the collapse of the ancient Mediterranean world around 1200 BC [1,3,5]. Cuneiform tablets foreshadowing the fall of the thriving coastal city Ugarit [2], and reliefs from Ramses III’s mortuary temple at Medinet Habou depicting a chaotic scene of boats and warriors entwined in battle in the Nile delta [11], attest that vast movements of seafaring and inland tribes, the Sea Peoples [12] (or Land and Sea Peoples), lie at the heart of changes for this period.

The Sea Peoples were seaborne foes [13,14,15] from different origins [6,12]. They launched a combined land-sea invasion (Fig. 1) that destabilized the already weakened power base of empires and kingdoms of the old world, and attempted to enter or control the Egyptian territory [11]. The Sea Peoples symbolize the last step of a long and complex spiral of decline in the ancient Mediterranean world [2,3,4,5]. Cuneiform tablets from Ugarit provide an impressive glimpse of the frantic preparations which the city and her neighbours pursued, in vain, to ward against the invasions [2]. The destructive operations of the Sea Peoples are later narrated by Ramses III who claims on his mortuary temple: “No land could stand before their arms: from Hatti, Qode, Carchemish, Arzawa, and Alashiya on, being cut off (destroyed) at one time” [16]. Within the conventional view, the Sea Peoples are linked in history to the collapse of the Late Bronze Age cultures [4], and 1200 BC stands as a symbolic date in human civilization.

Whereas the Sea People event constitutes a major turning point in ancient world history, attested by both written and archaeological (e.g. Ugarit, Enkomi, Kition, Byblos) evidence, our knowledge of when these waves of destruction occurred rests on translation of cuneiform tablets preceding the invasions (terminus ante quem) and on Ramses III’s reign (terminus post quem). Here, we report the first absolute chronology of the invasion from a rare, well-preserved Sea People destruction layer (Fig. 2) from a Levantine harbour town of the Ugarit kingdom. The destruction layer contains remains of conflicts (bronze arrowheads scattered around the town, fallen walls, burnt houses), ash from the conflagration of houses, and chronologically well-constrained ceramic assemblages fragmented by the collapse of the town. This stratified radiocarbon-based archaeology, with anchor points in...
ancient epigraphic-literary sources, Hittite-Levantine-Egyptian kings and astronomical observations, was used to precisely date the Sea People invasion in northern Levant, a decisive episode in a long-term collapse of the ancient Eastern Mediterranean world. By confronting historical and science-based archaeology, the data offer the first firm chronology for this key period in human society.

The harbour town Gibala, Ugarit Kingdom
Sample collection for radiocarbon ($^{14}$C) dating of the Sea People event was performed at the harbour town Gibala [17,18,19], a thriving Levantine trade center located at the southernmost edge of the powerful Ugarit kingdom [20,21]. Gibala (present Tell Tweini, 35°22′17.93″N, 35°56′12.60″E; elevation: 19 to 27 meters above sea level) was integrated into a large network of long-distance trading and cultural exchanges between the Aegean, Cyprus, the Levant, Egypt and Western Asia. Direct access from the Mediterranean to the Syrian heartland, Anatolia, and Mesopotamia afforded the ports of the Ugarit kingdom their wealth. This strategic position sets the chronology obtained for the destruction of Gibala by the Sea Peoples in a Mediterranean-wide perspective for the end of the Late Bronze Age (Fig. 1), extending over trade routes that crossed both land and sea. The place name Gibala appears on two 14th century BC cuneiform tablets from Ugarit [17]. The written Bronze Age sources or epigraphic finds for Gibala cease as soon as Ugarit was destroyed by the Sea Peoples. Gibala-Tell Tweini is a large multi-period site of $\sim$12 hectares (Fig. 2), which was occupied from Early Bronze Age IV (2400 BC) to Iron Age III (500 BC). During the past 11 years, large-scale
excavations have elucidated a thriving Bronze Age city that remained occupied during the Iron Age, with only short periods of abandonment despite a massive fire at the end of the Early Iron Age (short-lived sample: 2845 ± 35 \(^{14}\)C years before the present (\(^{14}\)C yr BP from AD 1950)) (Fig. S1) (Supporting Information S1). Gibala is a rare coastal settlement, alongside Tell Kazel, Ras Ibn Hani and Ras el-Bassit, with reoccupations after the Sea People event. A stable water supply, provided by the northern Rumailiah River and the southern Ain Fawar spring-complex, may explain resettlements on the Gibala’s alluvial plain since the Early Iron Age [10].

**Results and Discussion**

About 300 years after a first conflagration (short-lived sample: 3190 ± 40 \(^{14}\)C yr BP) (Table 1) (Supporting Information S1), the site was abandoned following a severe destruction at the end of the Late Bronze Age (Fig. 2). The widespread ash layer, termed Level 7A, contained rich finds (Fig. 3) including bronze arrowheads resulting from fights in the harbour town before its destruction, and a large variety of Mycenaean (Late Helladic IIIB), local Late Helladic IIIC Early, and Late Cypriot IIC ceramics (e.g. White slip II) highly significant for the Sea People event in the ancient Mediterranean world [17,18]. This ash layer is nearly synchronous with the Sea People destruction of Ugarit, and other northern Levantine coastal sites such as Ras Ibn Hani, Ras el-Bassit, Tell Kazel, and Tell Sukas [17]. Short-lived samples and young branches found in the destruction debris from eight key loci (Fig. S2) were dated by accelerator mass spectrometry (AMS). The samples pooled in the matrix (Table 1) are statistically the same at the 95% confidence level using a Chi-square (\(\chi^2\)) test (sample key 7, where \(T = 6.09 < 14.1\)). The weighted average date (2962 ± 14 \(^{14}\)C yr BP) gives a 1 sigma (\(\sigma\)) calibrated age range of 1215–1190 BC with 34.3% relative probability and another age range of 1180–1160 BC with 26% relative probability, using Calib-Rev. 6.0.1 [22] and Oxcal 4.1 [23] with IntCal09. Calibrated age ranges in details at 60.3% of the 100% dating probability (Fig. 4).

**Figure 3.** Gibala, Ugarit Kingdom: bronze arrowheads and typical ceramic assemblage for the end of the Late Bronze Age and the Sea People event in the Aegean and Eastern Mediterranean. Ceramics and arrowheads were retrieved from the destruction Level 7A. The \(^{14}\)C weighted average value and calibrations provide a robust chronological framework for the Sea People event. doi:10.1371/journal.pone.0020232.g003
date of the destruction Level 7A, between the end of the 13th century and the beginning of the 12th century BC or the first half of the 12th century BC. By contrasting historical-archaeological and radiocarbon-based data sets, the best candidate for the destruction date of the harbour town is the Sea People invasion. Their presence immediately after the destruction of Gibala is indicated by the material culture of the new settlements on the Tell namely the appearance of Aegean-type architecture, locally-made Mycenaean IIIC Early pottery, hand-made burnished pottery, and Aegean-type loam-weights. These materials, also known from Philistine settlements [24], are cultural markers of foreign settlers, most probably the Sea Peoples.

The internal consistency of the typical imported ceramic assemblage found in the destruction layer (Fig. 3) and the 14C dating results (Fig. 4) indicate that Level 7A is a secured layer to date the Sea People event in northern Levant. The Late Helladic IIIB-IIIC (Early) and Late Cypriot IIC-IIIA transitions respectively dated in mainland Greece to 1210–1175 BC [25] and in Cyprus to 1220–1190 BC [26–27], are markers for the end of the palatial civilization in both the Aegean and Cyprus. All the Mycenaean imports ended in the region of the Ugarit kingdom with its destruction by the Sea Peoples who interrupted trade routes. Neutron activation analyses suggest that the Late Helladic IIIB vessels found at Gibala until the 13th century BC originate from the northern Peloponnese area [19]. The Late Cypriot IIC ceramics were imported from Cyprus.

The 14C dating results of Gibala are closely matched with historical dates suggested by Egyptologists for the reign of the Sea Peoples event in the northern Levant.
Pharaoh Merneptah (1213–1203 BC), and Pharaoh Siptah-Queen Tawsret (1194–1186 BC) [28] (Fig. 4). The cuneiform tablets found in the ruins of Ugarit and Ras Ibn Hani (tablets RS 17.226, RS 18.038, RS 88.2158, RS 20.212, RS 20.238, RS 34.129, RS 34.129) are evidence for the rich correspondence between the last king of Hatti (Suppiluliuma II; first regnal year 1210 BC), the king of Egypt relating the execution of Bay in the first regnal year of Ramses III is variously dated in the literature [11]. The sun eclipse depicted on the cuneiform tablet KTU 1.78 (RS 12.061) found among the ruins of Ugarit. The solar eclipse related on the cuneiform tablet KTU 1.78 was dated to the 21 January 1192 BC [31].

Sea Peoples and Radiocarbon Datings

Table 1. Detail of the radiocarbon calibrated ages.

<table>
<thead>
<tr>
<th>Code</th>
<th>Material</th>
<th>Species</th>
<th>AMS $^{14}$C yr BP</th>
<th>$\delta^{13}$C, %o</th>
<th>1σ - 68%</th>
<th>2σ - 95%</th>
<th>Calibration periods BCE</th>
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<td>1680-1500</td>
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<td>1670-1490</td>
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<td>1670-1490</td>
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<td>1610-1430</td>
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<tr>
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<td>1400-1130</td>
<td>Sea People event Destruction Level 7A</td>
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<td>1270-1010</td>
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1 doi:10.1371/journal.pone.0020232.t001

14C, 13C, 12C; 1σ, 2σ; 68%, 95%; Bj, Bj, Bj; 7D, 6E, 6E; BCE, BC; Beta, Beta; Poz, Poz; Level, Level.
radiocarbon-based date of 1188–1177 BC for the Sea People invasions in the Nile delta. According to the 1192–1190 BC proposed date, the civilizations of the Aegean and Eastern Mediterranean were devastated long before the war the Sea Peoples waged against Ramses III’s army.

By a combined use of radiocarbon, archaeological and historical data, the first firm date of 1192–1190 BC is proposed for the terminal destruction and disintegration of Late Bronze Age societies in the Northern Levant. The collapse caused by the Sea Peoples marks a historical watershed and from these crisis years arose a new world. Later, the Greeks narrated and heroised this period with the myths and stories on the fall of Troy (Homer’s Iliad and Odyssey). Some of the Sea Peoples, the Philistines [12], received a significant recognition in Biblical texts [34], and the name Palestine derives from these settlers.

Materials and Methods

Quality control on sample collection for 14C measurements was undertaken during excavations. Only samples originating in reliable contexts with clear association to meaningful ceramic contexts and subsequently determined using optical and scanning electron microscopy pictures showed the Sea People event burnt macro-remains of short-lived samples (Olea europaea, Brassica oleracea) and branch (Olea europaea) with the associated calibrated radiocarbon date. Shown are olive stones (A–D; F; H), olive wood (G) and cabbage seed (E). The scale for each macro-remain is denoted on the pictures.

Figure S3 Calibrated calendar age probability distributions for the samples from the Levels 7D and 6E. The 1σ (68%) and 2σ (95%) confidence levels are respectively indicated by the upper and lower lines under each distribution.

Supporting Information

Figure S1 Gibala-Tell Tweini: storage jars found in the Early Iron Age destruction layer. The carbon-14 dating results provide a chronological framework for the Early Iron Age in the Northern Levant.

Figure S2 Scanning electron microscopy pictures showing the Sea People event burnt macro-remains of short-lived samples (Olea europaea, Brassica oleracea) and branch (Olea europaea) with the associated calibrated radiocarbon date. Shown are olive stones (A–D; F; H), olive wood (G) and cabbage seed (E). The scale for each macro-remain is denoted on the pictures.

References