**Bronze Age Collapse: Pollen Study Highlights Late Bronze Age Drought**

[](http://cdn.biblicalarchaeology.org/wp-content/uploads/bronze-age-sites.jpg)

Sites destroyed in the Bronze Age collapse around 1200 B.C.E.

 During the Late Bronze Age (1500–1200 B.C.E.), the Eastern Mediterranean boasted a flourishing network of grand empires sustaining sophisticated infrastructures, the likes of which the world would not see again for centuries to come. An interregional destruction (attested in Greece, Turkey, Israel, Syria, Lebanon and Egypt) known as the Bronze Age collapse is one of archaeology’s greatest mysteries.

 In the *Archaeology Odyssey* article “[When Civilization Collapsed: Death of the Bronze Age](http://members.bib-arch.org/publication.asp?PubID=BSAO&Volume=4&Issue=5&ArticleID=9),” William H. Stiebing describes the Late Bronze Age collapse:

It was a cataclysm of immense proportions: Near the end of the 13th century B.C.E., [the great Bronze Age civilizations of the Aegean and Near East](http://www.biblicalarchaeology.org/daily/ancient-cultures/ancient-near-eastern-world/what-does-the-aegean-world-have-to-do-with-the-biblical-world/) suddenly collapsed. In the latter part of the Late Bronze Age (c. 1400–1200 B.C.E.), Mycenaean civilization flourished in Greece and Crete. The Hittites controlled most of Anatolia and northern Syria from their capital at Hattusa. The Egyptian New Kingdom ruled not only in the Nile Valley but also in Palestine and southern Syria. Commerce flowed over trade routes that crisscrossed both land and sea. A late-14th-century B.C.E. ship excavated off the Uluburun promontory in southern Turkey, for example, carried cargo from Cyprus, Canaan, Egypt, Anatolia and Mycenaean Greece. A century later, all these civilizations had begun to unravel. Cities burned, trade became almost nonexistent, and large groups of people migrated from one place to another.

 The Bronze Age collapse was swift and sudden, ushering in a so-called “Dark Age” of decreased literacy, population and technology in much of the Eastern Mediterranean. However, as Thomas Fuller wrote in *A Pisgah Sight of Palestine* in 1650, “It is always darkest just before the Day dawneth.” The power vacuum and increased migration surely played a role in the emergence of the [Biblical Israelites](http://www.biblicalarchaeology.org/daily/ancient-cultures/ancient-israel/daily-life-in-ancient-israel/) and [classical Greeks](http://www.biblicalarchaeology.org/daily/ancient-cultures/ancient-near-eastern-world/the-athenian-acropolis/).

 But what caused the Bronze Age collapse? Scholars have proposed a combination of factors including marauding Sea Peoples, plagues and earthquakes leading to a so-called “systems collapse,” in which complex societal networks broke down under mounting interregional economic or demographic pressures. Some see Homer’s *Iliad* as an illustration of the warfare that brought about (or occurred in the wake of) the Late Bronze Age collapse.

[](http://cdn.biblicalarchaeology.org/wp-content/uploads/Sea-Peoples.jpg)

A 12th-century inscription describes Ramesses III’s defeat of the Sea Peoples.

 The Sea Peoples, a range of groups including the Philistines, led raids on the Eastern Mediterranean during the period of the Bronze Age collapse and are often cited as the reason for the collapse.

 A recent study of pollen grains in sediment cores beneath the Sea of Galilee and the Dead Sea provides a new view of the Bronze Age collapse. The research, published in *Tel Aviv: Journal of the Institute of Archaeology of Tel Aviv University*, suggests that drought may have played a major factor leading to the Bronze Age collapse. Every plant produces a distinct pollen print (see below), and the recent studies show a decrease in trees requiring a great deal of water and an increase in the cultivation of dry-climate trees, such as olive trees, during the period between 1250 and 1100 B.C.E. Tel Aviv University professor [Israel Finkelstein told the *New York Times*](http://www.nytimes.com/2013/10/23/world/middleeast/pollen-study-points-to-culprit-in-bronze-era-mystery.html) that pollen counts taken every 40 years are the “highest resolution yet in this region.” When compared with pollen data from Anatolia, Cyprus, Syria and the Nile Delta, the new studies suggest a broader climate change across the Eastern Mediterranean around the time of the Bronze Age collapse.

 The three-year pollen study is part of a broader scientific research project conducted by Israel Finkelstein and the Weizmann Institute’s Steve Weiner that includes DNA and molecular studies of archaeological data (click here to visit the [BAS Archaeological Technology Page](http://www.biblicalarchaeology.org/technology)).

 The new pollen data is critical for understanding the Late Bronze Age collapse. While a single source for the centuries-long upheaval seems unlikely, an extended period of drought may have led to economic failures and population migration, sparking broader military and other conflicts that broke down the extended imperial network of the Late Bronze Age. While Egypt, Hatti, Mycenae and others would never rise to their pre-collapse levels of prosperity again, the so-called Dark Ages saw the birth of some of history’s most prodigious cultures, including the Biblical Israelites.

**How to Read Pollen**

Special Feature: Read “How to ‘Read’ Pollen” by Vaughn M. Bryant, Jr. as it appeared in the November/December 2000 issue of *Biblical Archaeology Review* below. Read Bryant’s full article “[**Does Pollen Prove the Shroud Authentic?**](http://members.bib-arch.org/publication.asp?PubID=BSBA&Volume=26&Issue=6&ArticleID=2)” in the BAS Library.

 Pollen analysis—the application of statistical methods to the study of pollen—is less than a century old. Its basic principles were set forth by German geologist Lennart von Post (1884–1951), who used pollen to study past environments. He noted five key features of pollen. First, many plants produce vast amounts of pollen, which are dispersed by the wind. The average pine tree, for example, produces more than 100 billion pollen grains. Second, pollen has a very durable outer wall, called the exine, which can stay intact for a very long time. Examples have been found that are 250 million years old. Third, the general shape and the surface features of pollen vary between plant species, yet they are the same in all plants within the same species. Fourth, the distribution of pollen-producing plants is governed by such ecological factors as moisture, temperature and soil type; the more favorable the conditions for a particular plant, the more of that plant—and its wind-borne pollen—one would expect to see in that region. Fifth, almost all wind-borne pollen falls back to earth within about 30 miles of the plant that produced it, with the overwhelming majority (95%) found within a mile.

 Pollen, in sum, is plentiful, hardy, identifiable and traceable to its point of origin. Plants can produce a staggering amount of pollen. Swedish scientists estimate that the spruce forests in the southern third of their country release more than 75,000 tons of pollen into the atmosphere each year. Some flowering plants, however, generally those with colorful flowers to attract insects, produce relatively tiny amounts of pollen, relying on insects, birds or bats—rather than the wind—to carry out pollination.

 The rate of pollen production is an important factor in palynology. Specialists must first determine the expected amounts and the dispersal patterns (called the pollen rain) of a specific pollen type in a particular region and then compare that to what they find on the item under study. With the Shroud of Turin, for example, we must ask if the types and amounts of pollen on the shroud match the pollen patterns in Jerusalem.

 In court cases where pollen evidence is introduced, it is the pattern of pollen types—the “pollen print”—that can link a suspect to a crime scene. For example, in a case that took place in New Zealand in 1995–1996, a young woman was attacked and killed in a botanical garden. The suspect swore that he had never been at the site, but pollen embedded in his sweater came from plants not found in the area—except in the botanical garden. The suspect was convicted.

**Mycenae: The City of King Agamemnon**

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Described by Homer as a “strong-founded citadel” that was “rich in gold,” Mycenae was the greatest of the Mycenaean cities that flourished in mainland Greece from about 1600 to 1200 B.C. (In the Trojan War, Mycenae’s king, Agamemnon, is the king of kings who leads the Greeks into battle.) Around 1500 B.C. Mycenaeans conquered the island of Crete and adapted the Minoan script, called Linear A, to write their own language, an ancient form of Greek. This new script, called Linear B, was used solely for recording inventories and commercial transactions; hundreds of Linear B tablets have been found both on Crete and in such Mycenaean cities as Tiryns, Pylos and Mycenae itself. When Heinrich Schliemann excavated Mycenae in the 1870s, he uncovered royal shaft graves filled with extraordinary gold artifacts (such as the famous Mask of Agamemnon, shown at right). All of the Mycenaean cities were destroyed toward the end of the 13th century B.C. or the beginning of the 12th century B.C.

**Knossos: Center of Minoan and Mycenaean Civilizations**

[](http://cdn.biblicalarchaeology.org/wp-content/uploads/knossos.jpg)

The island of Crete gave rise to Europe’s first and most splendid Bronze Age civilization. In the early second millennium B.C., the Minoans, named by modern archaeologists after the legendary King Minos, built an elaborate palace complex at Knossos, which was excavated—and partly restored—by the British antiquarian Arthur Evans about a century ago. The Minoans were extremely influential in the Aegean and eastern Mediterranean—trading textiles, timber and wine to Cyprus for copper and Anatolia for tin. Minoan frescoes dating to the 17th century B.C. have been found in the Nile Delta, in the northern Levant and on the Anatolian coast. The Minoans also developed a script, the still-undeciphered Linear A, to write their language. In Knossos’s maze-like palace complex, Evans found frescoes of bull-leapers and exquisite bull’s-head rhytons, reflecting the Minoans’ reverence for the bull as well as the myth of Minos and the labyrinth he built to house the Minotaur. In the early 15th century B.C. Crete was invaded by Mycenaeans from the Greek mainland—who absorbed numerous aspects of Minoan culture (such as writing) and occupied the palace at Knossos.

**Troy: Homer’s great Late Bronze Age City**

[](http://cdn.biblicalarchaeology.org/wp-content/uploads/troy.jpg)

Located near the western entrance to the Dardanelles, ancient Troy (modern Hisarlik, in northwestern Turkey) grew rich levying mooring fees on vessels waiting to negotiate the straits leading to the Black Sea. First inhabited in the early third millennium B.C., Troy became an important commercial center for wool, horse-breeding and metalworking. (The gold objects of “Priam’s Treasure,” excavated by Heinrich Schliemann in 1873, are from the end of the third millennium B.C.) Late Bronze Age Troy, perhaps the city described by Homer, lasted from about 1700 to 1200 B.C.; this settlement featured towering fortifications and a great defensive moat. The citadel’s palaces were destroyed around 1250 B.C.—either by earthquake, fire or attack—and replaced by more modest buildings. Some 70 years later, Troy was attacked and burned, perhaps giving rise to oral stories that four centuries later would be written down by Homer.

**Hattusa: Capital of the Hittite Empire**

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So vast was the Hittite capital of Hattusa (modern Bogazköy, in central Turkey) that its circuit walls ran for six miles. The city contained a temple complex with a remarkable library of over 3,000 clay tablets—many of them written in Hittite, the earliest recorded Indo-European language. The Hittites worshiped their “One Thousand Gods” in the sanctuary of Yazilikaya, a rock outcropping 2 miles from Hattusa that was carved with images of Hittite and Hurrian deities and kings. By the mid-14th century B.C. the Hittites had become one of the Near East’s superpowers, rivaling Egypt in the south and Assyria in the east. Toward the end of the 13th century B.C., however, their kingdom suddenly collapsed and Hattusa was destroyed.

**Ugarit: A Fusion of Canaanite and Syrian culture**

[](http://cdn.biblicalarchaeology.org/wp-content/uploads/ugarit.jpg)

During the second half of the 14th century B.C., Ugarit, on Syria’s Mediterranean coast, experienced a period of great peace and prosperity. Ugarit’s merchants traded for Mesopotamian and Lebanese timber, Mycenaean pottery, Egyptian ivory, Cypriot copper and Anatolian tin. This was one of the Bronze Age’s most scintillating cities: Its citizens carved delicate ivory figurines (above), made elaborate inlaid furniture, adapted the Semitic alphabet for cuneiform characters and recorded numerous Canaanite myths, songs and stories. (Much of this was revealed by the French archaeologist Claude Schaeffer, who excavated Ugarit from 1929 to 1970.) Ugarit’s golden age ended around 1300 B.C., when an earthquake struck the region and a tidal wave and fire engulfed the city. A century later, invading Sea Peoples from the Aegean disrupted the city’s commercial routes and forced much of its population to migrate to other sites. The Sea Peoples eventually conquered Ugarit and set the city ablaze.

**Megiddo: City of Armageddon**

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Perhaps no other city in the ancient world is so associated with destruction as the mountaintop citadel of Megiddo, in north-central Israel. (The word “Armegeddon,” referring to the final battle between Good and Evil, derives from *har Megiddo*, a Hebrew term meaning “mountain of Megiddo.” Settled by Canaanites in the fourth millennium B.C., Megiddo prospered greatly during the Late Bronze Age. During this period, a palace was built near the gateway of the city, with an ingenious passageway cut through the bedrock to link the citadel to a spring outside the city’s walls. Around 1130 B.C., Megiddo and other Canaanite cities were violently destroyed—perhaps by a strong earthquake.