

stylus whose flat end served to smooth out and erase the writing. Tablets usually came in sets, up to ten tablets that were hinged or tied together. They were practical because they could be reused, but in Egypt, where wood was scarce and was imported, tablets were relatively expensive.

[See also Alphabet and Writing; Books; and Papyrology.]

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## WRITING SYSTEMS, AEGEAN

In the second millennium BCE, four distinctive but related systems of writing were invented and used on the island of Crete, the Greek mainland, and the island of Cyprus. The earliest of these were Cretan Hieroglyphic and Linear A (c. 1900–1450 BCE). The two later scripts, Linear B (c. 1500–1200 BCE) and Cypro-Minoan (c. 1500–1100 BCE), were adapted from Linear A. Each of these scripts came into being when preexisting illiterate systems for monitoring economic activities within their respective cultures were no longer sufficient. Thus in contrast to contemporary Egyptian and Near and Middle Eastern writing and the later Greek alphabet, we have no evidence that any of these Bronze Age Aegean scripts were ever used to write literature, law codes, religious texts, diplomatic correspondence, business contracts, or elite propaganda.

**Cretan Hieroglyphic and Linear A.** The Minoans, as the inhabitants of Bronze Age Crete are conventionally known, got the idea of writing through

long-established trade and cultural contacts with Egypt and the Near and Middle East. Their Cretan Hieroglyphic script is so named because the pictorial forms of its characters are reminiscent of, although not directly borrowed from, Egyptian hieroglyphs. The Minoan Linear A script has operating principles similar to those of Akkadian cuneiform. However, Linear A characters are drawn with lines into clay, in contrast to the wedge-shaped impressions from which cuneiform takes its name (in Latin, *cuneus* means "wedge").

The corpus of Cretan Hieroglyphic contains 340 inscriptions, divided by typology and purpose into four general categories: about 120 *inscribed* clay economic-control documents (thin rectangular tablets, four-sided bars, crescents, medallions, and nodules); about 140 stone seals that bear highly pictorial characters *carved* into their rectangular faces; about sixty *impressions* of such seals into clay sealings; and about twenty vases in clay or stone. These come from thirty-two sites on Crete (Knossos with 102 inscriptions and Malia with 106 account for 61 percent of the texts) and from the islands of Cythera and Samothrace. There are only seventeen hundred total signs preserved. So far, decipherment has been impossible. Cretan Hieroglyphic uses ninety to one hundred signs for sounds (phonograms), about thirty-three signs for objects (ideograms or logograms), and signs for numbers and fractions.

We now have about fifteen hundred Linear A texts containing fewer than eight thousand total signs. Inscribed clay tablets and/or sealings have been found at a dozen major sites on Crete, with Hagia Triada, Chania, Zakros, Knossos, Phaestus, and Palaikastro predominating.

The Linear A tablets are focused on primary economic resources and products within the regions controlled by these sites. Ideograms represent basic agricultural commodities (grain, figs, olives, wine), vases, livestock, and human beings. Clay sealings known as "nodules" (because they are formed around knotted string) authorized transactions. When inscribed, they mostly have inscrutable single signs known as "countermarks." Roundels, a type of sealing unique to Linear A, used writing and multiple seal

impressions to monitor quantities of allocated goods and the parties responsible for them. There are also economic inscriptions on storage pottery and some few painted inscriptions of unknown purpose. Unlike Cretan Hieroglyphic and Linear B, Linear A is used on dedicatory and ritual artifacts found at peak sanctuaries and in graves (stone libation tables, rings and hair pins in precious metals, miniature double axes, and one larger-scale functional bronze double axe).

The Linear A script has about one hundred phonetic signs and a like number of ideograms or logograms. In Linear A, logograms are frequently ligatured with phonetic signs (about 170 such examples are attested) that, judging from parallels in Linear B, specified features of the objects. Linear A uses single and combined fractional signs to specify increments of weight and measure.

Neither the Linear A accounting documents nor the dedicated objects give us enough variety or syntactical complexity to make proposed decipherments plausible or provable. By analyzing how the structure of the Linear B system of signs differs from the Linear A system, by assigning Linear B values to Linear A signs, and by studying probable Cretan words written in Linear B texts or preserved by later Greek lexicographers, we have determined that the main language represented by Linear A was open-syllabic (like modern Japanese) and that Linear A phonograms were open-syllabic, that is, pure vowels or combinations of consonants and vowels. As basic sounds (or phonemes) the "Minoan language" had three primary vowels (*a*, *i*, and *u*) and had consonants that were pronounced in combination with the sounds *y* and *w*. It used reduplication in its word formation. We can identify in context on the tablets the meaning of words like *ku-ro*: "total."

**Linear B and Cypro-Minoan.** The Linear B script is an adaptation of Linear A for the purpose of writing records in Greek. There are now about five thousand Linear B tablets (page-shaped or palm-leaf-shaped), labels, and sealings. These come from Knossos and Chania on Crete and from Pylos, Thebes, Mycenae, Tiryns, and Midea on the mainland. There

are no inscribed seals or inscribed dedicated objects, and the only sealings, inscribed or uninscribed, are simple nodules. Approximately 160 painted inscriptions on transport vessels known as "stirrup jars" give practical economic information about the process of manufacture of the jars or the perfumed oil they once contained.

There are well over fifty thousand preserved Linear B signs. The structure of the script follows closely Linear A: about eighty-seven open-syllabic phonograms and about 150 logograms. Linear B uses signs for units of weight and capacity in contrast with the Linear A use of fractions in combination. Linear B uses similar or identical logograms for the same objects that Linear A does, but it also has a full repertory of logograms for military equipment (swords, spears, chariots and their component parts, and armor).

We can read the Linear B texts because they represent an early form of Greek. They keep track of agricultural commodities, raw materials, manufactured items, animals, and human beings, often specifying their locations, and what individuals and groups owe to and derive from the palatial centers. Main subjects include land tenure; wool, flax, metal, and perfumed oil production; agricultural harvests and food distribution; offerings to sanctuaries and deities; contributions to communal feasts and the furniture, vases, and sacrificial instruments used on such occasions; the manufacture and distribution of military equipment; and the assignment of groups of human beings to work projects (e.g., wall construction, weapons manufacture) and military duties (e.g., as rowers and coastal watchers). The texts provide a rich collection of geographical, personal, occupational, and divine names, ethnic designations, and titles. They also use a full vocabulary for economic transactions and social, religious, and civic duties and rewards. These supplement the picture of Mycenaean civilization derived from archaeological evidence.

On the island of Cyprus, important as a source for raw copper, and at the Syrian trading center of Ras Shamra, the Cypro-Minoan script was used well into

the twelfth century. Two hundred inscriptions are now known. The signs and layout of the earliest Cypro-Minoan tablet from Enkomi are very similar to those used on Linear A tablets. Later Cypro-Minoan signs are composed of short quick straight-line jabs of the stylus into the moist clay. There is little use of logograms.

Besides tablets, Cypro-Minoan is inscribed on distinctive clay cylinders and clay balls. It is debated whether the later kind of Cypro-Minoan is one script with different variants or three distinctive writing systems. The connection of so-called Cypro-Minoan potmarks on Cypriote and non-Cypriote pottery found at sites throughout the eastern Mediterranean to the formal Cypro-Minoan script or scripts is still debated.

During the historical period (800–225 BCE) on Cyprus, an open-syllabic script, the Cypriote Syllabary, with no ideographic component was used to write a broad range of documents in Greek and an undeciphered indigenous language known conventionally as “Eteocypriote.” An inscribed bronze skewer from a tomb near Paphos can be read as the man’s name “Opheltas.” If the published excavation context is correct, the transition from Cypro-Minoan to Cypriote Syllabic was in the mid-eleventh century BCE.

[See also Alphabet and Writing; Linear B; and Literacy, Greek.]

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