

## ESSAY

## A century of puzzling

Believed to be the world's first printed document, the Phaistos Disc was unearthed 100 years ago.

**Andrew Robinson** explains why this remarkable object remains undeciphered.

The Rosetta Stone is the most famous of ancient inscriptions; it unlocked the meaning of thousands of Egyptian hieroglyphic inscriptions. The undeciphered Phaistos Disc, discovered by an Italian archaeologist at Phaistos near the coast of southern Crete a century ago next month, is perhaps the most infamous.

Luigi Pernier found the disc on 3 July 1908 in a basement cell of a ruined Minoan palace dating from the first half of the second millennium BC. No other samples of the script have turned up since. Pernier published his find in 1909 without trying to decipher it. The same year, archaeologist Arthur Evans, discoverer of ancient Knossos in the island's north, included fine photographs and good drawings of the disc in an appendix to his pioneering volume of Minoan inscriptions, *Scripta Minoa*. Tantalized scholars in many countries began to speculate as to its meaning. Evans's subsequent lengthy discussion of the disc in volume one of his celebrated *The Palace of Minos at Knossos*, published in 1921, threw down the gauntlet to would-be decipherers everywhere.

Over the past hundred years the disc has become notorious for three reasons. First, the pictograms on its clay surface have provoked dozens of wildly incompatible hypotheses about what it is and what it says. Competing interpreters have included a Cambridge classicist, a Harvard professor of zoology and, very recently, a geneticist from the University of Perugia in Italy. Interpretations range from astronomical calendars and bronze-age computers through board games to a victory chant and pre-homeric poetry, written in languages as disparate as Greek, Minoan, Hittite, Semitic, Egyptian and Slavonic. In the 1980s, the classicist John Chadwick, who helped to decipher the Minoan script Linear B, received roughly one claimed decipherment per month.

Around the same time, *National Geographic* even planned a lead story supporting a decipherment of the disc as a Minoan proclamation of war against Anatolia written in a 'Hellenic' dialect. Three senior classicists led by Chadwick persuaded the magazine to withdraw its embarrassing endorsement. Another of the three, Emmett

Bennett Jr of the University of Cincinnati, wrote in 1998 that any book cover emblazoned with the Phaistos Disc — and there have been many — was for him “the equivalent of the skull and crossbones on the bottle of poison”. In 2000, the *American Journal of Archaeology* ran a review titled “How not to decipher the Phaistos Disc”, by Yves Duhoux of the Catholic University of Louvain in Belgium, author of the leading scholarly book on the subject, *Le Disque de Phaestos*.

Second, the disc is notorious for being the world's first ‘printed’ document, predating Gutenberg's Bible by more than 3,000 years. As Jared Diamond explains in *Guns, Germs and Steel*, this is “a

threatening challenge to historians”, because it suggests that the history of invention is so idiosyncratic as to be unpredictable. How could printing, once invented, disappear for millennia?

Third, the disc is a Greek national icon, and a key attraction at the Archaeological Museum at Iraklion in Crete. The Greek authorities have rebuffed several appeals, most recently in 2007, for the disc to be thermoluminescence tested — a technique that reveals an approximate date of last firing for pottery. The reason, says Jerome Eisenberg, an expert in ancient forgery and fraud, and editor-in-chief of the international art and archaeology review *Minerva*, is that “no Greek scholar or



politician would dare to help 'destroy' such a national treasure".

The archaeological context of the disc's discovery implies a date of 1850–1600 BC. To suggest that it might be a 1908 hoax — Pilt-down man with a printing set — as two or three scholars, including Eisenberg, have proposed, is as heretical to Greek ears as the international scholarly allegations of the 1990s that Heinrich Schliemann may have faked some discoveries at Troy and Mycenae.

### Spiral stamps

The disc is made of fine clay. It is about 16 cm across and 1.9 cm thick. Both sides carry an inscription arranged in a spiral around the centre — characters impressed with a punch or stamp before the clay was fired. There are 241 or 242 characters (one is damaged), which comprise 45 signs of variable frequency. For comparison, there are thousands of characters in a few pages of printed English text, comprising the 26 signs we call letters. Lines partition the disc's characters into 31 short sections on side A and 30 on side B, most of which contain three, four or five characters. It is tempting to speculate that these sections represent words in the language of the disc.

That the characters were printed, not carved, is beyond dispute. But no one knows why the disc's maker bothered to produce a punch or stamp for each sign, rather than inscribing each character afresh. Egyptian hieroglyphs or Mesopotamian cuneiform of the second millennium BC are inscribed on stone or clay; ditto the Minoan scripts Linear A and B found at Phaistos, Knossos and other Cretan sites. If the punch or stamp was to 'print' many copies of documents, one would expect further samples to have turned up in a century of intensive Mediterranean excavation.

There is patchy and inconclusive evidence for and against the disc's Cretan origin. The signs look nothing like those of Linear A, Linear B or any other Minoan script, except coincidentally. This has led some, including Evans and Chadwick, to propose that the disc — and presumably its language, too — was an import. One sign bears a remarkable resemblance to the architecture of rock tombs found in Anatolia in modern Turkey. One or two others resemble signs found on a few contemporaneous objects from different sites in Crete. Most scholars today, including Duhoux, think it a plausible working hypothesis that the disc was made in Crete.

The puzzling artefact was almost certainly written from the rim to the centre. The impressions show that in some cases a character very slightly overlaps that to its right. This must mean that the scribe wrote the characters



Archaeologist Arthur Evans tantalized scholars with his description of the Phaistos Disc.

from right to left, probably revolving the disc for convenience. And a right-to-left direction is feasible, given the order of the characters, only if the disc was inscribed from rim to centre. Presumably, it was meant to be read in the same direction.

The character count and the number of signs tell experienced cryptographers two things (assuming that the writing represents a spoken language, rather than specialized notation as in a calendar or a game). First, the low ratio of character count to number of signs — compare the higher ratio in even one page of printed English — means we do not have enough text to decode it without help from other clues, such as archaeological context or knowledge of the likely underlying language. Computers are of no help here as they depend on statistical analysis of ample text.

Second, more helpfully, the script is probably a syllabary like Linear A and B. In a syllabary, most signs represent syllables, whereas in an alphabet the signs represent vowels or consonants. Syllabaries use more signs than alphabets: 48 for a Japanese *kana* and 87 for Linear B,

for instance. The 45 signs on the Phaistos Disc are too numerous for any known alphabet; the largest, Russian, has 36. And they are far too few to resemble a script such as Egyptian hieroglyphic or Babylonian cuneiform, which boast hundreds of logograms (word signs) along with their core phonetic signs. Moreover, the length of the disc's sections supports a syllabary — such scripts typically have words of this length as syllabaries are more concise than alphabets.

The full script probably used more signs than appear on the disc. A small sample of a text might omit less frequent signs: the preceding paragraph, for example, contains no 'q', 'x' or 'z'. Linguists have a formula for calculating the probable number of signs in an alphabet or syllabary from a small text sample. It works well with modern languages and writing systems such as the English alphabet, the Arabic consonantal script and the Japanese syllabic *kana*, and also with Linear B. This formula predicts a syllabary of 56–57 signs when applied to the characters of the Phaistos Disc, as Alan Mackay demonstrated in 1965. So there were probably 11 or 12 more signs than we see on the disc. This total would be manageable for printing — unlike, say, hundreds of logograms.

Every successful decipherment of an ancient script, from Egyptian hieroglyphs in the 1820s through Linear B in the 1950s, up to the Mayan glyphs of the past few decades, has depended for general acceptance on testing against plentiful virgin inscriptions. At present, all leading Minoan script researchers are compelled to concede that to make further progress on the Phaistos Disc we must hunt for more examples around the shores of the eastern Mediterranean. Such a breakthrough occurred with another fascinating solitary inscription — that of the Tuxtla Statuette, found in Mexico in 1902 and sent to the Smithsonian Institution in Washington DC. In 1986 a much more substantial example of the same script turned up at La Mojarra, not far from Tuxtla. The subsequent, controversial, decipherment made the cover of *Science*.

In the meantime, a thermoluminescence test for the Phaistos Disc is imperative. It will either confirm that new finds are worth hunting for, or it will stop scholars from wasting their effort. ■

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