

The origin of the ancient Egyptian drink *Shedeh* revealed using LC/MS/MS

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Abstract

Ancient Egyptians were buried with the most precious food and drink as sustenance for their afterlife. One of these was *Shedeh*, the most valued and appreciated beverage in ancient Egypt. The botanic origin of *Shedeh* remains unclear as no mention of its raw material has survived. Some scholars have proposed that *Shedeh* was a pomegranate wine, while others, a grape wine. Presented here is the first ever analytical evidence of *Shedeh*'s origin through the analysis of a sample of a residue from an extraordinarily well preserved *Shedeh* amphora from King Tutankhamun's collection. The previously developed LC/MS/MS wine markers method for archaeological samples was used and our results reveal *Shedeh* had a red grape origin.

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1. Introduction

Ancient Egyptian texts describe the *Shedeh* drink as a gift from the sun god Ra to his sons [4], bestowing it with divine power, ensuring it was of the highest quality, and that *Shedeh* was served in the most valuable vases. However, the real meaning of the name of this Egyptian drink, *Shedeh*, which appeared at the end of the XVIII Dynasty in the mid-14th century BC [1], is unknown. The *Shedeh* drink has been defined in the bibliography as “it could be pomegranate wine” [9] or “a beverage akin to wine” [7].

A study of the *Shedeh* inscriptions on pottery jars concluded that *Shedeh* could be more closely identified with a traditional wine and specifically, a cooked wine

was proposed [4,13]. However, to date, its botanical origin has never been proven.

To discover the true origin of this Egyptian beverage, the wine markers method previously developed [8] using liquid chromatography coupled to mass spectrometry in tandem mode (LC/MS/MS) was applied, in the first ever scientific research on *Shedeh*'s raw material. Two wine markers in archaeology, tartaric acid and syringic acid derived from malvidin-3-glucoside, were investigated in a sample of a residue from an extraordinary *Shedeh* amphora.

2. *Shedeh*'s significance

The name *Shedeh* appeared inscribed on the labels of Egyptian two-handed pottery amphorae at the site of el-Amarna and belonging to the reign of Akhenaten, late XVIII Dynasty. Its name showed it was a beverage

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different from the traditional (grape)wine, whose Egyptian name was *irep* [6]. An example of the importance of *Shedeh* in ancient Egyptian times was the fact that it was cited in the Egyptian romantic poetry, where *Shedeh* was associated with a lover's voice [13]. During the Rameside (1292–1075 BC) and Ptolemaic (305–30 BC) periods, the *Shedeh* drink was recorded on temple inscriptions, and used as a religious offering as well as for embalming [13].

Hundreds of inscriptions on amphorae dated late XVIII–XIX Dynasty from Malkata, el-Amarna, the Ramesseum and Deir el-Medina have been found. It is significant that only 15 of them have been documented bearing the name *Shedeh*, from el-Amarna, Tutankhamun's tomb at Western Thebes and Maya's tomb at Saqqara [13]. Most of the *Shedeh* inscriptions are on shards and they included the year, quality, property, region and vintner's name as with the best wines of that age.

One of these *Shedeh* inscriptions was written on an amphora (Fig. 1) found in 1922 by Howard Carter at the intact Burial Chamber of Tutankhamun (1333–1323 BC). On finding the amphora Carter wrote on the archaeological card: "What exactly *Shedeh* is, is not known. A kind of beer, date-wine etc are possible" [2].

Some authors have translated the word *Shedeh* as pomegranate wine [5], a tenuous proposal as this supposition was established by Loret [10] from a text from the reign of Ramses II (Anast. IV, 6–7) which referred to a garden in which two fruits were found (grapes and pomegranates). The three drinks obtained from them were wine, must and *Shedeh*. Loret suggested that *Shedeh* was a pomegranate wine [10]. Meanwhile, other authors have proposed *Shedeh* could have been a grape wine with a distinct and elaborated preparation [13]. Despite the substantial information regarding all aspects of life in ancient Egypt recorded on temples, tomb walls and papyrus, *Shedeh*'s raw material has never been

revealed to us in the ancient Egyptian texts. The only known report on *Shedeh*'s preparation was described on the Papyrus Salt 825 from Late period (715–332 BC). However, this text lacks information on the raw material: "It is (...) repeat the filtration; heating again. This is the way to prepare the *Shedeh*" [4]. Due to a gap in this papyrus, the initial ingredient is not known. Moreover, the only information we have on the preparation of *Shedeh* is on an inscription at Dendera's temple (MD 4,77a) as "the beautiful work of Horus in the lab through the cooked extracts of Shesmou, the God of the press" [4]. Derchain [4] concluded that even if *Shedeh* was a type of wine, the description on the Papyrus Salt 825 eliminates the possibility that it could have been must or ordinary wine because they are not heated.

3. The sample

With permission of the Egyptian Supreme Council for Antiquities and the Egyptian Museum in Cairo, a sample of the dry black residue from inside the Tutankhamun's *shedeh* amphora *Journal d'Entrée* number 62315 (Fig. 1) from the Egyptian Museum, was taken for analysis. Carter found this well preserved amphora lying on the ground beside the south wall inside the Burial chamber of King Tutankhamun's tomb in the Valley of Kings (KV 62) at Western Thebes, Egypt. The food and wine were placed on the Annexe chamber, but three of the amphorae were placed inside the Burial chamber beside the south, west and east walls, respectively. The two amphorae found at the west and east positions were labelled *irep* [5].

The hieratic inscription on the amphora studied in this paper records: "Year 5. *Shedeh* of very good quality of the House-of-Aton of the Western River. Chief vintner *Rer*" and "very good" is also stipulated on the top of the amphora [3].

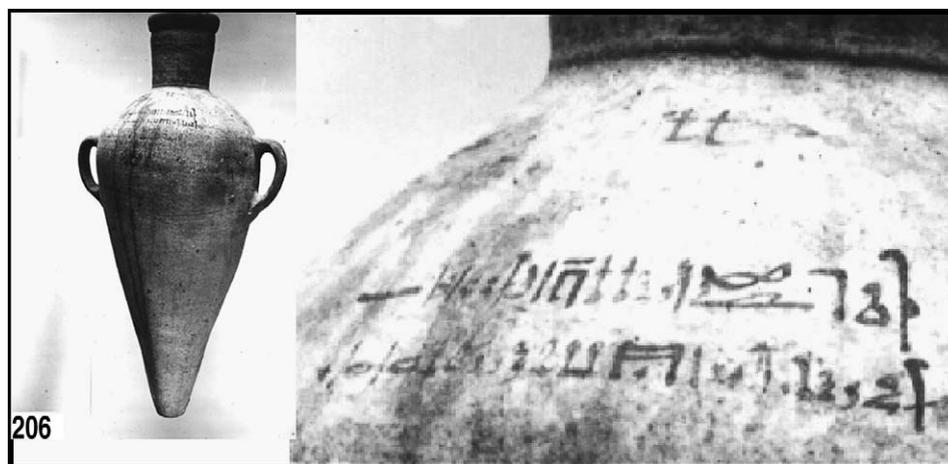


Fig. 1. Tutankhamun's amphora (JE 62315) at the Egyptian Museum in Cairo with the inscription including the name of the product contained: *Shedeh*. The two signs on the top indicate it was "very good". Photo: Copyright Griffith Institute, Oxford.

4. Results and discussion

In this work we have used the LC/MS/MS method previously developed for the identification of wine markers in archaeological samples [8]. Briefly, an amount of approximately ~ 2 mg of sample was extracted with formic acid 0.1% in water/methanol (80:20). An alkaline fusion was performed with potassium hydroxide pellets in the same quantity. The extracts were injected in the LC/MS/MS system in multiple reaction monitoring (MRM) mode, the most sensitive MS method which allowed the structural elucidation and compound confirmation compared with the standard.

Tartaric acid, the grape marker in archaeology [12] as it is exclusively found in grapes in the Mediterranean and Near East areas, was first investigated in the sample. On the MRM chromatogram at m/z 149 \rightarrow 87 transition for tartaric acid (M_w 150), a peak at

retention time of 2.61 min (Fig. 2A) appeared at the same retention time as the standard of tartaric acid injected in the same conditions, showing the presence of tartaric acid in the *Shedeh* sample.

Moreover, the presence of syringic acid, recently confirmed as a red wine marker for archaeological samples [8] was also investigated in the sample, before and after performing the alkaline oxidation. Identification of syringic acid was done by injection of the sample in MRM mode of the m/z 197 \rightarrow 182 transition. Before alkaline fusion, no peak of syringic acid (M_w 198) was detected in the MRM chromatogram (Fig. 2B) at 18.35 min, which is the retention time of syringic acid standard. However, after performing the alkaline fusion, a peak of syringic acid at 18.35 min was identified in the sample (Fig. 2C), released from the main red wine pigment malvidin-3-glucoside through the breaking down of the polymerized pigment which had formed over time [11].

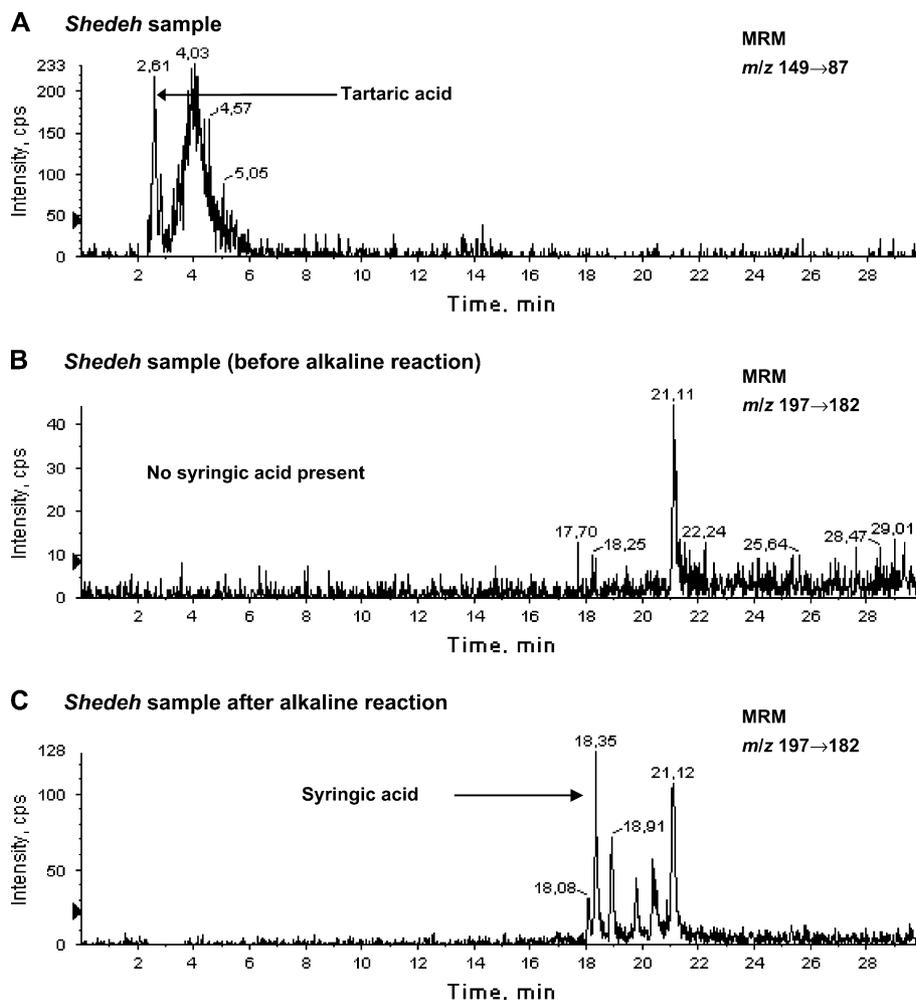


Fig. 2. LC/MS/MS chromatograms in MRM mode for the sample of residue from Tutankhamun's *Shedeh* amphora. (A) The grape marker tartaric acid is identified in the sample. (B) The red grape marker syringic acid is not present in the sample as it is in a more complex form. (C) By performing the alkaline reaction to the sample, a peak of syringic acid is identified, having been released from malvidin-3-glucoside in the pigment.

These results reveal the *Shedeh* residue sample came from grapes, in particular red grapes.

5. Conclusion

By applying the previously developed LC/MS/MS wine markers method to a sample of a residue from the Tutankhamun's amphora inscribed *Shedeh*, tartaric acid and syringic acid derived from malvidin-3-glucoside, markers for *Vitis vinifera* and the red cultivars, respectively, were identified. Our results definitively reveal that the ancient Egyptian highly valued *Shedeh* drink was a grape product, specifically made from red grapes. These results will help future investigations to uncover the precise preparation of the *Shedeh* drink.

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