Proceedings of the 10th International Congress
on the Archaeology of the Ancient Near East

Volume 2

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Marta Luciani, Markus Ritter, Mattia Giudetti,
Roderick B. Salisbury, Felix Höflmayer
and Teresa Bürge

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Prehistoric and Historical Landscapes
& Settlement Patterns
Edited by Roderick B. Salisbury

Economy & Society
Edited by Felix Höflmayer

Excavation Reports & Summaries
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Foreword to the 10th ICAANE Proceedings

The 10th anniversary of the International Congress on the Archaeology of the Ancient Near East was held from 25th to 29th of April 2016 in Vienna, hosted and organized by the Institute for Oriental and European Archaeology (OREA) of the Austrian Academy of Sciences. More than 800 participants from 38 different countries found their way to Vienna to celebrate the 10th anniversary of ICAANE with a wide range of 8 scientific sections, 28 workshops and round tables, a huge poster exhibition and a special section about 'Cultural Heritage under Threat'.

The topics in focus of this ICAANE covered traditional, as well as new fields, in relation to state-of-the-art approaches and methodologies. The general themes of transformation and migration, cultural landscapes, religion and rituals, environmental shifts, contextualized images, as well as economies and societies, are currently promising fields in archaeology and these proceedings give new insights into former Near Eastern societies. These general questions are obviously challenging topics in present times, too, a fact that is leading us archaeologists into a dialectic discourse of past and present social phenomena. This additional impact within our scientific community and beyond is underlining the ongoing fascination and power of Near Eastern archaeology. The first volume includes papers of the sections 'Transformation and Migration', 'Archaeology of Religion and Ritual','Images in Context' as well as 'Islamic Archaeology'. The second volume is dedicated to the sections 'Prehistoric and Historical Landscapes and Settlement Patterns', 'Economy and Society', and is completed by 'Excavation Reports and Summaries'. A number of presented posters are integrated in the theme relevant chapters too. I would like to express my sincere thanks to the editors of these sections, namely Teresa Bürge, Mattia Guidetti, Felix Höflmayer, Marta Luciani, Vera Müller, Markus Ritter, Roderick Salisbury and Christoph Schwall.

Altogether 28 workshops focussing on special research questions and themes demonstrated the ongoing dynamic and new inputs in Near Eastern archaeology. The engaged discussions of internationally high-ranked experts with young scholars was essential for the success and open atmosphere of the 10th ICAANE in Vienna. I would like to express my sincere thanks to the workshop organisers, who are also acting as editors for the separate workshop volumes, published as internationally peer-reviewed books in the OREA series of the Austrian Academy of Sciences, of which some are already in print, accepted or in preparation at the moment. The conference was delighted to have two keynotes given by Mehmet Özdoğan and Timothy Harrison; both pointed to the current political conflicts and related massive destruction of cultural heritage from different perspectives. In facing the current conflicts and continuing damage of cultural monuments in regions of the Near East, we are confronted with situations going far beyond the usual scientific challenges. Although we have to observe highly frustrating ongoing destructions and can hardly influence the general political situation, the archaeological

community is responsible for supporting, re-evaluating and advancing ongoing essential strategies in digital preservation of the cultural heritage and other current activities in that field.

Therefore, we decided to organize a Special Section within the 10th ICAANE about *Cultural Heritage under Threat*, where well-known experts and political authorities discussed the current challenges and future perspectives in a very fruitful and open atmosphere.

This special section was organized with the great support of Harald Stranzl, the Austrian Ambassador at UNESCO for the Austrian Ministry of Europe, Integration and Foreign Affairs. The discussions and contributions were accomplished by signing the 'Vienna Statement' (s. below) by a total of 34 authorities for antiquities in Near Eastern countries, European institutions and stakeholders. My sincere thanks are expressed to Karin Bartl and her engagement in organizing this special section.

The 10th ICAANE aside its impact on international archaeology, can additionally be seen as a powerful boost for the archaeological endeavours in Austria and for our local scientific community, not at least visible in the fruitful cooperation of several archaeological institutions acting committedly in our Local Organising Committee: the Historical-Cultural Faculty and the Faculty of Philological and Cultural Studies (University of Vienna), the Egyptian and Near Eastern Collection of the Kunsthistorische Museum, the Austrian Archaeological Institute, members of the Austrian Academy of Sciences as well as the Institute for Oriental and European Archaeology. My sincere thanks go to Manfred Bietak, Vera Müller, Hermann Hunger, Bert Fragner, Regina Hölzl, Claudia Theune-Vogt, Michael Doneus, Markus Ritter, Christiana Köhler, Marta Luciani, Sabine Ladstätter, Karin Kopetzky and Angela Schwab for their engagement in the local committee and making this conference real. I extend sincere thanks for financial support to several Austrian and international institutions, which are The Austrian Federal Ministry of Europe, Integration and Foreign Affairs, the University of Vienna, the City of Vienna, the Vienna Science and Technology Fund (WWTF), the Institute for Aegean Prehistory (INSTAP), the Austrian Orient Society/Hammer Purgstall Society and the Austrian Academy of Sciences.

The OREA institute took over the honourable duty hosting this conference with lots of effort and energy, all our institutes' members, students and scientists were involved in some parts and the OREA team together was making this conference running. Particular thanks and recognition also go to Angela Schwab, Ulrike Schuh and Christine de Vree. Finally, I thank the ICAANE Scientific Committee and the Harrassowitz Publishing House.

Prof. Dr. Barbara Horejs
Director of the Institute for Oriental and European Archaeology
Austrian Academy of Sciences

ECONOMY & SOCIETY

edited by F. Höflmayer

Glass Vessels from Hellenistic Jebel Khalid on the Euphrates, Syria: An Indicator of Greek Influence in the East? Questions of Production

Wendy J. Reade[1] – *Karen L. Privat*[2]

Abstract

Jebel Khalid, on the west bank of the Euphrates River in northern Syria, is a purely Hellenistic garrison city built early in the 3rd century BCE and abandoned c. 70 BCE. The presence of a considerable quantity of glass from this unique single-period Greek site gives us the rare opportunity to investigate well-dated Hellenistic glasses in the context of the ancient Near East and of eastern Mediterranean raw glass and vessel production. For over a thousand years, glass in the eastern Mediterranean had been produced and distributed from Near Eastern centres. This paper considers physical and chemical aspects of Jebel Khalid glass compared with other Hellenistic glass to explore questions of Greek influence in the eastern empire through the production and distribution of glass vessels.

1. Introduction and aims

This paper explores aspects of Hellenistic glass production and technology of the eastern Mediterranean world arising from recently published chemical analyses of glass from the Seleucid site of Jebel Khalid in northern Syria (Reade and Privat 2016). The glass vessels from this single-period Hellenistic site are reliably dated between the late 2nd century BCE and the abandonment of the site in the late 70s BCE (O'Hea 2002: 245–246; Clarke and Jackson 2014: 97). As an eastern Greek garrison city, seated high above the Euphrates River, Jebel Khalid provides the opportunity to explore questions of Greek influence in the eastern empire through the production and distribution of glass vessels (Fig. 1).

The Australian excavations from 1984 until 2011 uncovered a large corpus of glass vessels on the Acropolis of the site (Clarke 2002a). The typological and chemical compositional studies of this material contribute to the discussion of Greek interactions in the East, and to our understanding of glass technology and trade around the eastern Mediterranean at this time. Argument based on typological and stylistic observations continues with regard to whether the Hellenistic glass in the East is of Greek or local origin, whether it was produced at one or several locations, and where it was traded, amongst other questions that seek to understand the cultural, economic and technological dynamics of Greeks in the East, following the conquests of

1 Department of Archaeology, The University of Sydney, NSW 2006, Australia.
2 Electron Microscope Unit, Mark Wainwright Analytical Centre, The University of New South Wales, Kensington, NSW 2052, Australia.

Alexander the Great. The consideration of chemical compositional data from Jebel Khalid glass analyses compared with those of contemporary glasses from the Hellenistic empire aimed to elucidate the nature of Hellenistic glassmaking, and to see if relationships could be established intra- and inter-regionally.

2. Background and cultural context

The analysed glass was excavated from a two-storied administrative public building, or palace, originally built in the 3rd century BCE on the Acropolis of Jebel Khalid (Fig. 2). This building is a mixture of Greek architecture with Mesopotamian or Achaemenid features of palace design (Clarke 2002a: 25–48; O'Hea 2002: 245–246). The considerable quantity of repetitive pottery and glassware recovered represents large-scale dining and drinking, perhaps by the governor and his garrison troops in Macedonian style (Clarke and Jackson 2014: 101–102).

The majority of glass vessels were cast monochrome bowls or drinking cups, the most common form of glassware used in the Hellenistic world prior to the development of blown glass in the Roman Levant of the 1st century BCE (Grose 1989: 193; O'Hea 2002: 245). Many of the bowls were decorated with internal and external wheel-cut horizontal grooves. These open, sagged or cast bowls found in the Levant were made in a limited range of forms and colours (Grose 1979: 54, 56, chart; 1989: 193, fig. 110). The greater presence of deep hemispherical bowls over conical forms has been taken to indicate a Greek Seleucid rather than local north Syrian preference (O'Hea 2005: 48). However, the general uniformity of colour, form and decoration of the monochrome bowls across the eastern Mediterranean gives little indication of production locations or distribution patterns of these vessels.

Even the more distinctive vessels are difficult to provenance. A small number of bowls found on the Acropolis at Jebel Khalid were identified as petal-decorated, and vertically fluted, based on Achaemenid metal prototypes (O'Hea 2005: 44; O'Hea 2006–2007: 142), and developed in glass in the Greek world from the early into the late Hellenistic periods. The cast fluted bowls belong to a series of Aegean Hellenistic cast bowls that are found for example on Delos, in the Athenian Agora and on Cyprus. Very few examples have been found in Eastern locations, such as Tel Anafa, although they are referred to as 'Syro-Palestinian' (Grose 1989: 194; O'Hea 2002: 256; 2011: 256). They could have been produced on the Greek mainland or islands, and seem to have been distributed to Asia Minor and the Near East as a result of Hellenised taste in the Levant in the later Hellenistic (O'Hea 2002: 245–254; O'Hea 2006–2007: 142–143; O'Hea 2011: 154). Incomplete cast-footed, or carinated vessels, two mosaic-cane bowls, and one core-formed alabastron were also identified. The mosaic bowls made with spiral canes are similar to those found on the Antikythera shipwreck, 80/50 BCE, and have parallels dating back to the mid–2nd century BCE (O'Hea 2002: 258; Weinberg 1965: 34–37), although they are not seen elsewhere in the Levant inland from the coast (O'Hea 2005: 48),

and may have been the product of workshops in Alexandria or the Aegean (Jackson-Tal 2004: 27; 38).

The discovery of imported Greek ceramics on the Jebel Khalid Acropolis indicates that activities were likely to have followed Greek customs in this elite area. Rhodian amphora handles found in the housing insula suggest that the inhabitants were dining and drinking in Greek style. This contrasts with some of the more local Syrian influences seen in cooking wares and the eastern stylistic aspects of the palace building (Clarke 2002b: 288; Clarke and Jackson 2014: 107–108). Was the glass at Jebel Khalid Greek or Eastern or a fusion of both?

3. Insights from compositional analyses

3.1 Natron vs plant ash

Chemical analysis of the Jebel Khalid glass and comparison with glass composition data from sites across the Hellenistic empire has provided further insights into glass production. See Table 1 for dates and publication details of comparative Hellenistic glass discussed in this study.

Early glass was typically made of silica from sand or quartz pebbles, combined with a soda flux derived from either plant ash or mineral soda (natron), and lime as a stabiliser (Turner 1956; Sayre and Smith 1961; Henderson 1985; Barkoudah and Henderson 2006; Shortland *et al*. 2006). All Jebel Khalid glasses analysed by Reade and Privat (2016) have a typical silica-soda-lime composition, and all but two were fluxed with natron, indicated by their relatively low concentrations of magnesia, potash and phosphorus (Brill 1999a: 277; Tite *et al*. 2006). The elevated concentrations of these oxides in two samples indicate that they were fluxed by the addition of plant ash. During this period of predominantly natron-fluxed glass, regions east of the Euphrates River continued to produce plant ash fluxed glass (Bucsek 1987; Rapin 1992: 148; Arletti *et al*. 2006: 241; Tite *et al.* 2006: 1284–1285; Henderson 2013: 204). The two plant ash glasses found at Jebel Khalid could therefore have originated from this more eastern region. This means that both glass-fluxing techniques known in the ancient world were present at Jebel Khalid.

A small number of plant ash glasses that could have been imported products from east of the Euphrates were found at the sites of Pherai, and the Rhodes Bead Factory. The picture of distribution networks thus extends beyond the eastern Mediterranean region, and it is unsurprising that these connections would exist within an empire that stretched to Bactria and dominated this whole region. Interestingly, the corpus of glass from the treasury of the Hellenistic palace at Ai Khanoum in Afghanistan, the only other single period Hellenistic site excavated in the East, is predominantly plant ash fluxed in the eastern mode. The concentrations of magnesia and potash in these glasses (generally > 2%) are however somewhat higher than in the plant ash glasses from the eastern Mediterranean sites (< 2%). It appears that at Ai Khanoum glass from the eastern Med-

iterranean was not sought in preference to the 'local' product, despite this city being a wealthy and significant part of the Hellenistic empire. The cultural and economic implications deserve to be examined in more detail, but are beyond the scope of this study.

While natron and plant ash base glass compositions provide evidence of more than one glass production centre, they do not distinguish whether the natron glass was a product of Greek or Levantine workshops, or of both. Further investigation through trace element and isotope analysis is the next step.

3.2 Natron base glass comparisons

The chemical analyses of the natron-fluxed Jebel Khalid vessel glasses have shown that their basic compositions are closely similar, whether they are fluted, petal-decorated, or monochrome, mosaic or core-formed (Reade and Privat 2016). Was most of the Jebel Khalid glass manufactured in the same primary production centre? Was that centre in Greece, the Aegean (Rhodes), the Levant, or even Alexandria as suggested for the mosaic bowls? Or could such a highly consistent product have been made at various centres in the region, because all the workshops used closely regulated batch ingredients in carefully controlled and widely understood production practices?

When Jebel Khalid glass is compared with other Hellenistic natron glasses from Macedonia, Anatolia, Rhodes, and Syro-Palestine (Table 1), the majority has closely similar concentrations of key components, such as magnesia and potash, as illustrated in the bi-plot of these oxides (Fig. 3). The natron glasses exhibit fairly consistent base glass compositions regardless of colour, vessel type, manufacturing technique, or origin across all sites studied (Reade and Privat 2016).

Despite the close similarities of base glass composition overall in these glasses, there are still small unexplained variations in concentrations of oxides such as soda and lime (Fig. 4) (Reade and Privat 2016), that hint at production variables that could include different raw material sources, production practices and/or geographical locations of glass manufacturers. These questions need to be explored further.

3.3 What colourless glass reveals

Modifying agents could be added to the silica-soda-lime base glass to create colour, or remove colour to form colourless glass. We know from Pliny's Natural History (e.g. 37.33.111–112) that colourless glass was much admired for its resemblance to rock crystal. The Jebel Khalid corpus contains a large number of colourless, that is intentionally decoloured, glasses. Much of the sand used in ancient glassmaking contained iron as an impurity (Turner 1956: 62T; Caley 1962; Mirti *et al.* 1993; 2008; Brill 1999a; Freestone *et al*. 2000), and this unintentional inclusion of iron in the glass batch can be responsible for colouring raw glass blue, green, yellow and brown (Weyl 1951: 89–91; 119–120; Bamford 1977: 143, 155). Colourless glass was therefore not natural, unless the batch ingredients were pure, but could be achieved by adding a decolouring agent (Weyl 1951: 97; Jackson 2005: 764).

Since the Iron Age of the early 1st millennium BCE antimony had been used in Near Eastern glassmaking both to opacify and to decolour glass. It could also serve as a fining agent to remove seeds or bubbles from molten glass (Weyl 1951: 116, 118, 121; Turner 1956: 179T; Sayre 1963: 272; Brill 1970: 116; Bamford 1977: 80). By the later Hellenistic period, the properties of manganese as a glass decolourant had been discovered (Weyl 1951: 116; Bamford 1977; Brill 1988: 277; Jackson 2005: 764; Connolly *et al*. 2012: 95; Henderson 2013: 246). Examination of colourless and faintly coloured (imperfectly decoloured) glasses from Jebel Khalid and other Hellenistic sites reveals a significant development in the nature of the decolourant used in this period (Reade and Privat 2016). The earlier colourless glasses from Vergina, Pydna and Gordion of the mid-4th to the early 2nd century BCE were decoloured with antimony. Later colourless glass from Tel Anafa, and most of the colourless glass from Jebel Khalid of the mid-2nd tothe early 1st century BCE, was decoloured with manganese instead. The colourless glass from Pherai in Thessaly, Greece, and the Rhodes Bead Factory group, slightly earlier than and contemporary with Tel Anafa and Jebel Khalid, is decoloured with antimony. There is only one sample decoloured with antimony from the Rhodes Necropolis bowls group, while another two glasses contained both antimony and manganese decolourants. Both decolourants are also found together in glass from the Rhodes Bead Factory, and from Pherai, and in four glasses from Jebel Khalid. No colourless glasses were reported in the analyses of Ai Khanoum material.

By the mid-2nd century BCE, manganese decoloured glass was being produced alongside antimony decoloured glass, both technologies existing side by side through to the 1st century BCE (Reade and Privat 2016). We see in the Hellenistic period the transition from the use of antimony as a decolourant since the early 1st millennium BCE, to the introduction of manganese as a decolourant that was favoured into the 1st millennium CE. It is tempting to consider that the overlap of these practices represents regional differences in colourless glass manufacture by competing Syro-Palestinian and Aegean industries. The chronological progression during the Hellenistic period of the traditional use of antimony as the sole decolourant in ancient glassmaking, to the introduction, overlap and eventual predominance of manganese as a decolourant is illustrated in Table 2.

The elevated concentrations of both antimony and manganese together in a small number of decoloured samples suggests at least two alternative explanations: 1) both decolourants were combined to achieve colourless glass, but the reason for this is unclear because antimony had been used alone successfully for centuries; and 2) the glass used to make the vessels was acquired from two different manufacturing traditions, perhaps as a result of a) recycling (Jackson 2005: 771–772; Brill and Stapleton 2012: 284; Connolly *et al*. 2012: 95–96), or b) the mixing of raw glass from two different contemporary primary production centres. It is interesting to note that cullet was found at the two Rhodian sites where this mixing occurs, perhaps linking recycling with the mixing of the two decolourants. With reference to available data, manganese decoloured glass does not appear before approximately the mid-2nd century BCE (Tel Anafa and Jebel Khalid). The mixed antimony and manganese

examples date between the 3rd and 1st centuries BCE. The period of overlap of these technologies cannot therefore be before the mid-2nd century BCE. It is therefore proposed that this is the time at which manganese was first used as a decolourant.

4. Vessel production models

Physical typology of Hellenistic drinking bowls is rarely distinctive enough to assign origin, and the lack of known manufacturing installations makes the questions of how many workshops, where they were located and what they produced very difficult to answer. It must be remembered too that physical typologies based on vessel form and decoration may only indicate where secondary production occurred, and this may not be the same as the location of glass manufacture. While chemical analyses of glass compositions can provide complementary data and greater insight into glass production, the number of chemical analyses of glasses from these regions in the Hellenistic period is limited.

The lack of definitive evidence for primary and secondary production workshops has led to much discussion about the location of these centres in the eastern Mediterranean. Rhodes is believed to have been the production site of glass for core-formed vessels from the 6th century BCE, and is the only manufacturing site known from this period (Weinberg 1966; Triantafyllidis 2000; 2009; Rehren *et al*. 2005). Evidence for glass production is lacking from the Levantine coast, although this region was significant in pre-Hellenistic and post-Hellenistic Roman glass production (Brill 1988: 265–267; Jackson-Tal 2004: 11; Kowatli *et al*. 2008; Henderson 2013: 217). It seems reasonable to suggest that it must have continued to be an important manufacturing region throughout the intervening Hellenistic period as well.

Trade in raw glass ingots is well attested in the Mediterranean region long before the Hellenistic period, as we know from evidence such as the glass ingots sunk in the Late Bronze Age Uluburun shipwreck off the south coast of Turkey (e.g. Bass 1987). It has been suggested that large numbers of late Hellenistic bowls excavated from Syro-Levantine sites were the products of one or more local coastal glass industries that also exported raw glass around the Mediterranean (Jennings 2000: 56; Jackson-Tal 2004: 26–27), but this does not explain the 'Greekness' of vessel forms and decoration observed at Jebel Khalid. Both Rhodes and Macedonia in Greece have been put forward as possible vessel manufacture locations from the 3rd century BCE (Triantafyllidis 2000: 13; O'Hea 2006–2007: 142). Perhaps secondary production workshops in the Aegean were using glass from Levantine primary production, though it would mean raw glass was exported to the Aegean and reimported to the Levant as a finished product. Or were vessels of 'Greek' style manufactured in the Hellenistic Levant itself to the requirements of its local Greek customers?

Figure 5 illustrates four theoretical production models that might explain the curious and subtle similarities and variations that the physical and chemical evidence presents for the monochrome drinking bowls: the glass and vessels were made and

decorated in one centre (on the right); the glass and vessels were made in one centre, but were decorated by cutting to local tastes at a later stage, somewhere along the route of distribution (on the left); and the process of primary or raw glass manufacture was performed at a different location to vessel forming and decoration, at one or two subsequent workshops (shown in the centre). This set of models allows for a tertiary stage of production, i.e. decoration by wheel-cutting, to account for some of the complexities of perceived similarities and differences in the drinking vessels. The contemporaneity of antimony and manganese decolourant techniques points to two different, but co-existing productions, perhaps alongside glass recycling that has resulted in the mixing of these two products, further adding to the intricacy of this commercial enterprise.

5. Summary

While comparison of natron base glass compositions from around the Hellenistic eastern Mediterranean revealed a highly consistent product, made with similar batch ingredients in well-regulated proportions, there are subtle variations in basic composition that suggest that there was more than one natron glassmaking centre in the region at this time, in addition to the plant ash tradition still operating east of the Euphrates. A new decolourant process using manganese was introduced by the mid-2nd century BCE and was used alongside the traditional antimony decolourant, also suggesting more than one primary production centre was operating in the Aegean and/or Levant.

Vessel production and decoration could have occurred at many secondary and even tertiary workshop sites. Vessel form, decorative style, manufacture method and colour are not related to basic glass composition. Differences in form and decoration of chemically similar glass vessels at Jebel Khalid and comparative sites could be explained by a series of production models ranging from the achievement in one workshop of glass manufacture, vessel forming and decoration, to the distribution of raw glass to workshops that both formed and/or decorated vessels in a two- or three-step process. These production models could have operated simultaneously alongside centres that recycled cullet and reworked it into new vessels in a one-stop process, as suggested by the addition of both decolourants in some colourless glasses. Consideration of these alternative models acknowledges not only the various manufacturing possibilities, but also the complexities of glass production and distribution in a vast empire.

The Greeks on the Acropolis of Jebel Khalid might have been living and dining in Greek style, but with little manufacturing evidence discovered so far, limited comparative chemical data, and lack of distinguishing physical characteristics, we must look to trace element and isotope analyses to further investigate questions of production.

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Fig. 1 Map showing the location of Jebel Khalid on the Euphrates River, and other locations mentioned in the text

Fig. 2 View to the Euphrates River from the Governor's Palace administrative building on the Acropolis, Jebel Khalid

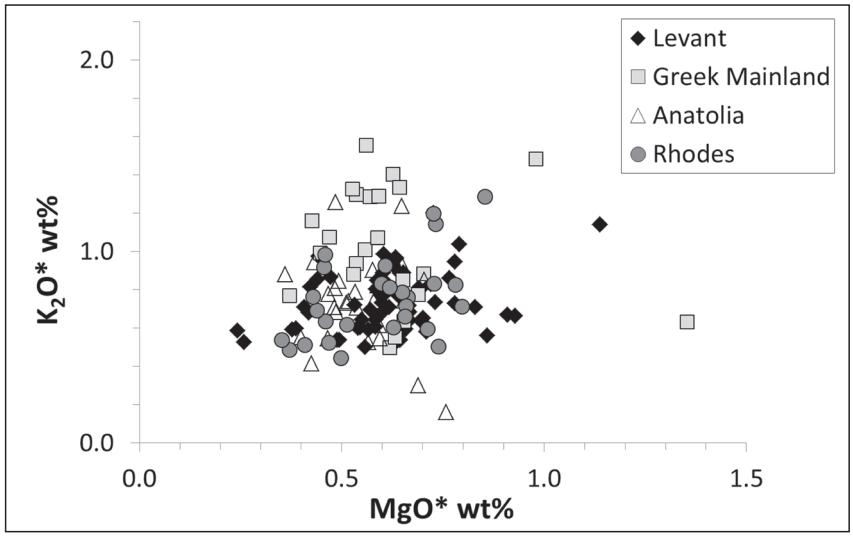

Fig. 3 Bivariate plot of magnesia *vs* potash for comparative Hellenistic natron-fluxed glasses from Jebel Khalid and Tel Anafa (Levant), Gordion (Anatolia), Pydna, Vergina and Pherai (Greek mainland), and Rhodes. Reduced and re-summed glass compositions were used to compare data between sites (indicated by asterisks). See Table 1 for glass data source publications

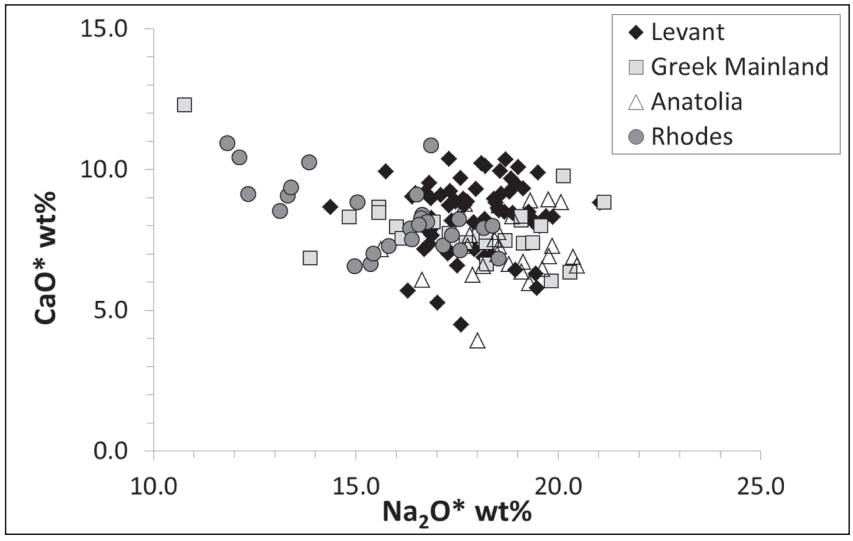

Fig. 4 Bivariate plot of lime *vs* soda for comparative Hellenistic natron-fluxed glasses from Jebel Khalid and Tel Anafa (Levant), Gordion (Anatolia), Pydna, Vergina and Pherai (Greek mainland), and Rhodes. Reduced and re-summed glass compositions were used to compare data between sites (indicaed by asterisks). See Table 1 for glass data source publications

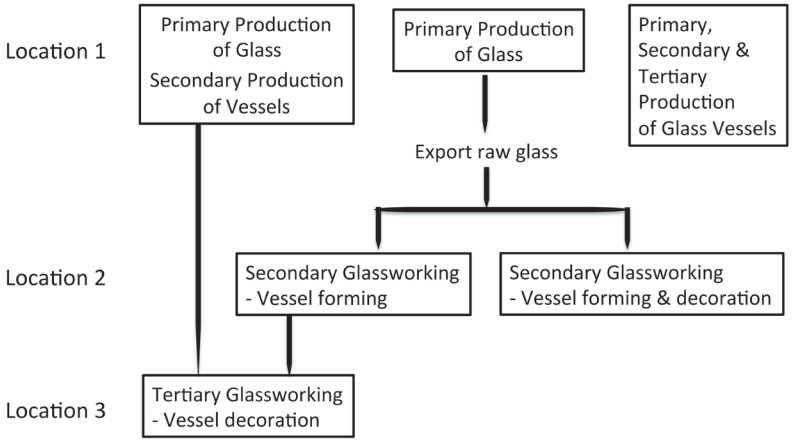

Fig. 5 Hypothetical Hellenistic glass production models

Site	**Date**	**Publication**
Vergina (Macedonia, Greece)	c. 340 BCE	Brill 1999a: 51–52; 1999b: 65
Gordion (central Anatolia)	c. mid-4th–early 2nd century BCE	Reade *et al.* 2012
Pydna (Macedonia, Greece)	c. 300–290 BCE	Ignatiadou 2000
Bead Factory (Rhodes)	late 3rd–2nd century BCE	Brill 1999a: 51; 1999b: 63–64
Ai Khanoum (Afghanistan)	3rd–mid-2nd century BCE	Bucsek 1987; Rapin 1992: 148
Pherai (Thessaly, Greece)	3rd–1st century BCE	Connolly *et al.* 2012
Rhodes Kakoula Property	c. 175–150 BCE	Rehren *et al.* 2005
Tel Anafa (Israel)	c. 150–75 BCE	Brill 1999a: 53; 1999b: 67
Jebel Khalid (northern Syria)	late 2nd century–70s BCE	Reade and Privat 2016
Rhodes Necropolis	2nd–1st century BCE	Brill and Stapleton 2012: 48, 115

Table 1 Comparative glass from Hellenistic sites

Date	Antimony	Both in one glass	Manganese
mid-4th to early 2nd century BCE	Vergina Pydna Gordion		
3rd to 1st century BCE	Pherai Rhodes Bead Factory	Pherai Rhodes Bead Factory	
2nd to 1st century BCE	Rhodes Necropolis	Rhodes Necropolis **Jebel Khalid**	**Jebel Khalid** Tel Anafa

Table 2 Chronological distribution of antimony and manganese decolourants in Hellenistic glasses by site