A HOARD FROM THE TIME OF YAZDGARD III IN KIRMĀN

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Abstract

The analysis of a hoard from the time of the collapse of the Sasanian Empire offers new insights into the administrative situation within the realm of Yazdgard III during his presence in Kirmān. Interpreting die chains using old or newly engraved dies with the then anachronistic name of the previous *shāhānshāh* Khusrō II, and finding an unlikely variety of mint abbreviations and dates within one workshop, allows us to infer the processing of huge amounts of silver in an unregulated way, compared with the orderly mint administration before the battle of al-Qādisiyya. A rigorous numismatic conclusion makes the change to a centralised minting in Kirmān likely where coins, rather than the dies, were sent to the districts. The key dates of the hoard coincide with the battle of Nihāvand 642 and the beginning of the invasion of Kirmān. Many of the coins bear *dipinti* with legible Pahlavī inscriptions, highlighting a cultural way of marking coins at the end of the Sasanian Empire.

Keywords

Sasanian Empire, Khusrō II, Yazdgard III, Kirmān, al-Qādisiyya, battle of Nihāvand, Arab conquest, coins, hoard, metal analysis, writing material, dipinti

I. INTRODUCTION: RETRIEVAL OF INFORMATION FROM A DISPERSED HOARD

Unprovenanced hoards which are diluted with other material to an undefined extent and enter the market piecemeal from storage boxes and dealers' bags, tend to deter any serious scholarly approach; for ethical reasons such material should be dismissed and their study seriously considered. Such hoards cannot be satisfactorily reconstructed. In the present case the nature of the material under study and the research questions it asks are different.[1] After an initial survey of the material the results struck the authors so profoundly for the period of Yazdgard III, that they tried to retrieve as much information as possible. While the hoard as a whole is beyond reconstruction, a thorough and systematic comparison of dies, metal composition, and *dipinti* allowed us to propose a workshop or related workshops producing coins with massive random die linkage probably at the time of Yazdgard III (r. AD 632–51), perhaps more specifically in the years between AD 642, the battle of Nihāvand, and AD 645–46, the year of the closing coin. The results have provided new information of Yazdgard's presence in Kirmān and the building-up of resources for a defence of the empire, before the Arab attack on Kirmān.

In Summer 2009 a parcel of about 800 coins was brought to the attention of the authors in Berlin,[2] followed in October 2011 by another group of about 1200 coins, almost all from the reign of Khusrō II (r. AD 590/1–628). Further parcels surfaced in May and December 2012, and in February 2013; the latter three consisted predominantly of diverse material from other hoards, but obviously diluted with "residue" Khusrō II coins of that oddly die-linked hoard. A further group almost similar to the first two Berlin parcels containing fewer than 1000 coins reached the London market in 2011.[3] Another parcel is reported as having arrived in about 2011 at a dealer in Los Angeles.[4] In that year also, a Russian collector acquired a parcel

[1] Such unfortunate blends occur far too often in the trade, destroying historical evidence right at the source. Nevertheless, as historians we have a responsibility to take every bit of evidence into historical consideration and source criticism, and retrieve and preserve information.

[2] Parts of the first group of 2009 were later sold by Stephen Album, Santa Rosa.

[3] Kindly reported by Susan Tyler-Smith.

[4] I owe this information to Robert Schaaf. This parcel also comprised coins with *dipinti* but they had been cleaned off.

of about 560 coins allegedly from a Chinese dealer who claimed that these coins came from Afghanistan.[5] Other parcels probably entered the market unnoticed. Features indicated that most of the coins of the early parcels belonged to a single hoard, although this could not be proved for every single coin. In September 2013, a final selection of forty-three Yazdgard III coins was studied (Berlin VI), being from the same group as the Yazdgard coins, which were occasionally found in previous parcels and featured some the same technical peculiarities, surface colouring, and corrosion as those from the oddly die-linked hoard. The original hoard might have by far exceeded 3500 items. Only the Berlin II parcel of 2011 allowed for a systematic die study within a limited time. Not all technical data could be systematically registered, such as weight and die axis. More important for the present research questions, was a systematic study of the dies. Every die within the Berlin II parcel was recorded with photographs, whether the coins were die-linked or not. This parcel forms the core of the present study. As a rule, from the first and later parcels only die-linked coins and coins with *dipinti* were documented with photographs. Where appropriate, further material was added from the above-mentioned diverse parcels in London, Moscow, and the US, but only through photographs, not personal examination.[6]

The coins belonging to the original oddly die-linked hoard among the uncleaned coins of the Berlin II parcel, which exhibited a light greenish turquoise corrosion with a light fine beige-coloured clayish covering, showed a bright whitish lustre when cleaned. Those surface features were common among the coins connected with the die chains and a number of unconnected coins, with and without *dipinti*, suggesting that the original hoard included coins of the workshop of the oddly die-linked coins as well as ordinary Khusrō II and Yazdgard III coins.[7]

Even a casual initial browse through all the Khusrō II coins of the Berlin I and II parcels revealed that many of them were not only in mint condition, retaining some of their original lustre,[8] but many of them were struck by the same dies, with large numbers from the same pair. Some, but not all, even had a seemingly awkward rendering of the portrait and other coins showed an extensive use of the die, with the surface worn down and partly scaled off over time. Even where the portrait seems awkwardly rendered, all iconographic features of the later Khusrō II series were understood and correctly reproduced by an engraver with an untrained hand.

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5 I am grateful to Vladimir Belyaev for this information. A selection of this parcel is uploaded on www.zeno.ru. These coins have only partially been included in the present die studies due to the difficulties of working with low-resolution images produced as scans. Any information about the whereabouts of hoards has to be taken cautiously. "Afghanistan" often figures as a general label for any hoard from Iran, India, Pakistan, Usbekistan, or perhaps even Xinjiang.

6 In March 2012 a parcel containing a hoard of sixty-six coins was brought to the attention of the authors from the same source: sixty-five coins of Ardashīr III, and one of Yazdgard III (NAL 7); Heidemann 2013. In September 2013—at the same time as the Berlin VI parcel—a second parcel of 176 coins of the same group was also recorded, containing at least five coins of Yazdgard III, which seemingly belonged to the first parcel based on the toning of the coins. The closing coin was again dated Yazdgard regnal year 7. The greyish toning and corrosion of the coins in these two Ardashīr parcels seemed slightly, but significantly, different from that of the light green, almost turquoise, corrosion on whitish coins of the oddly die-linked hoard. What does connect them is the large number of *dipinti*, twenty-two coins from the first parcel and sixty-three from the second. The coins of the first Ardashīr parcel are included in the study by Dieter Weber, presented here in Section V. The publication and the reading of the *dipinti* of the second Ardashīr parcel will follow soon.

7 Some coins were cleaned, thus altering their toning. Some retained their green corrosion. The group in question, which showed a light greenish corrosion, when cleaned exhibits a bright whitish lustre and yellowish beige clay traces. No coin was clipped. A second group in the parcel comprised coins with a fine beige clay on a slightly greyish surface. The groups were hard to differentiate. They were probably parts of two different hoards. The one with the greyish surface is beyond any reconstruction. A third group had thin black chloride corrosion (horn silver) usually on a white slightly grey-bluish circulated surface. This part had no connection with the oddly die-linked hoard in question. In addition, further hoard material and some single finds may have entered the parcel. Some *drachm*s, from their appearance clearly set apart from the oddly die-linked hoard, might even have been slightly clipped. The separation between the coins of the original hoard with the oddly die-linked coins and the hoard with the greyish surface and further intruders was clear in most cases.

8 Most of the coins retained a greenish corrosion; only a few of them had already been cleaned when Stefan Heidemann saw them.

II. QUESTIONING THE AUTHENTICITY OF THE ODDLY DIE-LINKED GROUP

The authenticity of the hoard was questioned soon after the massive random die combinations were detected. The late Thomas Mallon in a blog on Sasanian coins in August 2011 was the first to cast doubt and initiate a lively discussion. Naturally the whole group came under suspicion of being modern forgeries.[9] The doubts included the "impossibility" of such random die linkages under Khusrō II, and certain features of the fabric of the coins such as hammered edges, craquelure of the surface, and the large number of deteriorating dies, were discussed.

The majority of the coins that are linked to extensive die chains and/or were related to them show slightly hammered edges, as a result of a technical process. A flan was usually cut from flattened silver sheets with metal scissors.[10] Late Sasanian flans were neatly flattened usually with four hammer strokes on an anvil—one stroke on each of its four segments—leaving them slightly slanted.[11] This effect is still apparent on the marginal fields of some of the freshly minted coins, where the margin is seemingly divided by four smoothly slanted sections, sometimes forming a framing "tetralobe" around the centre. While one side was flattened with a hammer the other side lay on the metal surface of the anvil, and gained the incuse pattern of that surface. A curious hatched pattern of the anvil surface thus appears on the margin in the areas where the die did not hit the flan (especially the spandrels of the "tetralobe").[12] Most Sasanian coins have such unstruck areas in the margin but the areas are smooth and flat. Hatched unstruck surfaces are not uncommon and can also be found on other coins, thus being in turn an indicator of their authenticity.[13]

The flan was struck with a pair of dies, the obverse die slightly concave and the reverse slightly convex. The edges might have been hammered along the ridges to give the coin a rounder appearance and remove sharp edges left by cutting the flan from the silver sheet. Hammering of the edges was an extra effort to assure the integrity of a coin against fraudulent clipping.[14] Early Sasanian coins do not have this additional feature. Most Sasanian coins from the period of Khusrō II have rounded edges due to flan flattening without any additional treatment of the edges. Hammered edges became frequent during his reign; a few are seen for the early period, but it became more common in about the third decade of his reign. This change in technology deserves further study. Hammering of the edges became the rule under Ardashīr III and continued with his successors.[15]

Some dies, such as obverse die 13 (but others too), suffered material fatigue and a gradual scaling-off of the die's surface, while the engraved features lost sharpness with abrasion over time. We do not know how many coins were struck with each die, but this fatigue might point either to an excessive use over an extended time, longer than usual in a Sasanian mint under Khusrō II, or to technical problems of hardening the engraved dies resulting in that scaling-off of the surface. Both explanations suggest a hasty production, where the quantity of well-regulated trustworthy coins mattered, but not the quality of die engraving.

The medium weight is always high, about 4.12–4.15 g, although not all coins could be weighed.[16] As expected, the die axis oscillates slightly around 3 h to around 9 h for all the coins checked, with only a few exceptions.[17] None of the coins linked with the die chains

[9] Thomas Mallon, personal communication, 11 Aug. 2011. The discussion was mainly led by Thomas Mallon, Susan Tyler-Smith, and Stefan Heidemann.

[10] Göbl 1967.

[11] As an example for this common phenomenon, see the coin of Queen Bōrān in Ahghari 2011: 399, no. 1005.

[12] E.g. no. 0068 (obv. 16-rev. ART26a) or no. 0568 (obv. 36-rev. WYHC35a).

[13] E.g. a *drahm* from the Shiraz Hoard, Khusrō II, no. 315 (mint ST, year 12), to be published by Susan Tyler-Smith. In Heidemann's photograph files, also Kavādh, AY 37 (Photo SB 02480).

[14] It was suspected that these hammered edges might disguise cast coins or flans, but cast metal would not respond that smoothly to hammering and the coin would crack. Moreover, the flans are irregular as they are produced with cutouts from metal sheets.

[15] The hammered edges are as yet rarely noted as a special feature. For example, see the hammered edges on the Ardashīr hoard in Heidemann 2013. For the flattened and slanted margin, see esp. coins nos. 4, 7, 10, 11, 13, 16, 20, 31, and 66.

[16] Cf. the Bīshāpūr hoard, where Szaivert (1978–79) found an average weight of 4.133 g; he did not measure the median. See also Gyselen 1989 on the Susa II hoard; the average weight here is 4.028 g and the median 4.17 g.

[17] Because of limited time not all die axes of Berlin II could be checked. Coins of the die chains and coins of Berlin II parcel which are not (yet?) linked to the chain (some of them have the same puffy round letters) have a die axis of 6 h: AY 35, no. 0146; ART 25, nos. 7736, 7737, 7738 (the latter three obv. die no. 13); ART 26, no. 0068 (obv. die 15); WYHC 35, no. 0570; and 12 h: ART 37, no. 0096 (obv. die 53), ML

or with the related oddly die-linked hoard was clipped. The first wave of clipping of Sasanian coins presumably started with the main series of Sasanian-style coins in the 650s to a weight of *c.* 3.9 g.[18] This gives the oddly die-linked hoard a firm *terminus ante quem*. The *dipinti* on the coins are undoubtedly written by trained seventh-century hands. At least six almost legible *dipinti* are found on coins linked to the die chains.[19]

A final proof for the authenticity of the die-linked series is found on one coin (no. SB 01351; die 13–Art25a), struck with a die from the chains, which was recorded in July 1996 when it was acquired for a private collection.[20] The dies of one of the related Yazdgard III coins (BN12E-e; no. 0221; Figure 13) were already known in the nineteenth century, the coin once belonging to the collector Ivan Alexeievich Bartholomaei (1813–70).[21] This coin is now preserved in the collection of the State Hermitage Museum in St Petersburg.[22] Two Yazdgard coins match another already published coin in the Tübingen University Collection, acquired in 1993; one of the two matches both dies (BN*12F-p; no. 6029), the other one only matches the obverse die (BN*12F, no. 6021).[23]

III. THE DIE CHAINS

For the present study all dies of the 1200 coins of the Berlin II parcel were studied, documented, and compared with each other; occasionally, those from the Berlin I parcel and selected coins from other parcels were included. The regnal years indicated on the Khusrō II coins of the die chains lie between year 25 and 37. Some die combinations are represented by up to 100 coins (obv. die 13–ART25a); other combinations figure just on a single unsuspicious coin. Many dies seem to have been engraved by the same hand (puffy letters, almost circular eye, blobby nose). This feature could also be found on coins that could not (yet?) be linked. This variance in number and the similarities in style suggest that the actual number of dies used in this/these makeshift workshop(s) must be higher.[24] It soon became clear that a study of the parcel only covers part of a wider phenomenon. It seems almost certain that production of the workshop(s) probably included many more dies and combinations than the ones linked here.[25]

The present study identifies five die chains. They seem to be connected with each other by certain features, which will be discussed below. Chains 1 to 4 connect reverses with different mint abbreviations and years. Die chain 5 covers only coins of ART 37 and its silver composition is slightly distinct from chain 1. ART 37 figures prominently in the first and fourth chain, while the abbreviation ART is common to all chains. The current count presents twenty-five obverse and twenty-four reverse dies, among 409 coins counted so far within the chains.[26] The unexpectedly

38, no. 0372; ShY 33, no. 0475 (nearer 1 h). Some coins of the Berlin VI parcel of Yazdgard have exhibited a 6 h (BN 14, no. 6040) and a 12 h (BN *12, no. 6032) orientation.

18 Heidemann 1998: 101; Gaube 1973: 3; Walker 1941: cxlvi-cxlvii.

19 Nos. 0232 (dipinto, no. 7); 7737 (dipinto no. 8); 7738 (dipinto no. 9); 7739 (dipinto no. 10); 7740 (dipinto no. 11); 7745 (dipinto no. 12).

20 Photo no. SB 01351. This particular coin circulated and has survived a quite different chemical environment than the crisp coins of the oddly die-linked hoard. The state of attrition of the obverse die (die no. 13) of the 1996 coin lies within the reconstructed sequence of die use at the end of the early stage of deterioration between coin nos. 0060 and 7735 of the present catalogue. This proves that the coins of the hoard were not struck from a copied original die.

21 For the biography see Dorn 1873: 1–4; Köhne 1871–73.

22 Tyler-Smith 2000: no. 35, pl. 16, obverse die O34/R34.

23 Tyler-Smith 2000: no. 51a, Universität Tübingen 1993-17-41. Tyler-Smith attributes this coin to the year 16. The Tübingen coin has the typical hammered edge and the four slightly slanted fields of the obverse margin.

24 According to Esty's die estimation formula (2006), the number of dies might not increase much, because we have a sample of 409 coins in the die chain, and only three obverse dies represented by just a single coin. But this calculation for an estimated number of dies is biased in the present case, where the number of coins in the sample is directly related to the inclusion of a die into the die chains. One has to consider all coins which may possibly be part of the die chains, but not yet proven as such, and on the opposite only those coins which are clearly linked to the chains. In the first case there is an almost indefinite number of singletons, raising the number of estimated dies; in the second case are coins which have a proven die link, limiting and decreasing the number coins and thus the number of estimated dies.

25 Because we have to assume that all mint abbreviations in the die chains are fictitious, they are rendered as abbreviations and the mint city to which the abbreviations refer is not named.

26 The obverses within the chains are named with a two-digit number: the first indicates the chain, the second the individual die within the chain. Obverses that are not included in the die chains are named according to their mint abbreviation, the year, and a capital letter. The reverse dies are named by the mint abbreviation, the year, and a small

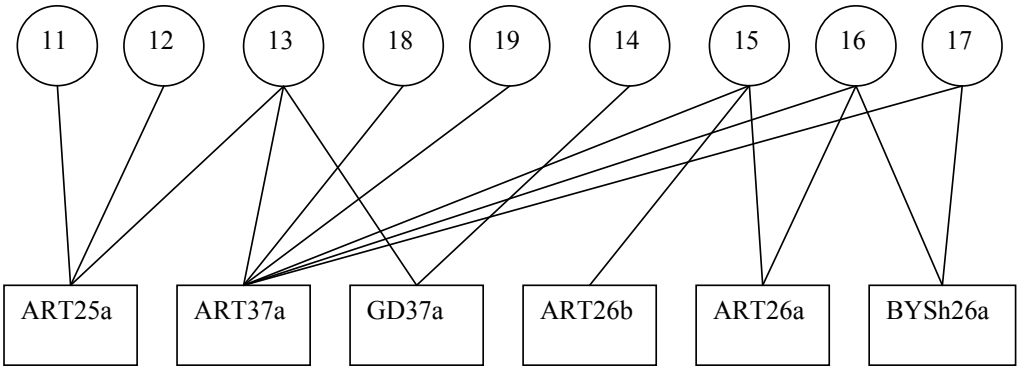


Fig. 1. Die chain 1.

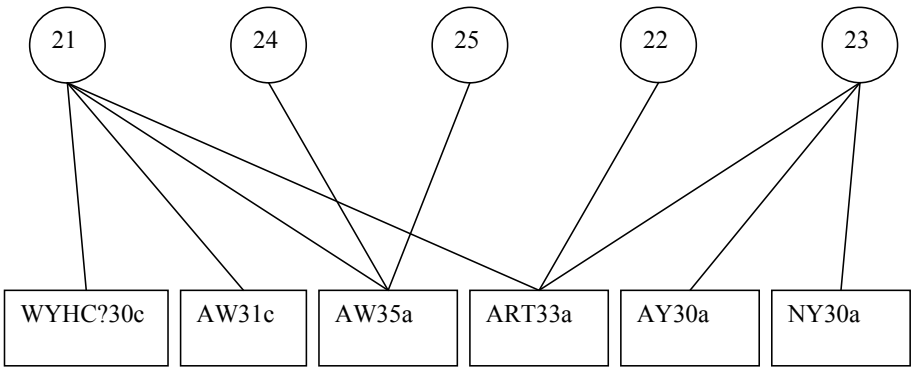


Fig. 2. Die chain 2.

higher number of obverses is a result of the method of study, and does not necessarily reflect the original ratio between obverses and reverses involved.[27] Finding reverses with random mint abbreviation and years linked to a specific obverse die is difficult, while—when already having a reverse die of a certain mint abbreviation and date—the linked obverses can easily be established among a small group of coins sharing the same mint abbreviation and date, thus increasing the number of obverses above the number of reverses.

Chain 1 (Fig. 1) is the most extensive, currently including nine obverses and six reverses. The reverses are ART25a, ART26a, ART26b, ART37a, BYSh26a, and GD37a. Obverse die no. 13 was most extensively used, accounting for at least 127 coins so far, or more than a fourth of all obverse impressions thus far recorded. Obverse die no. 13 was matched with ART25a (100 coins), ART37a (5 coins), and GD37a (22 coins). Die no. 13 wore off over time, slowly lost its original crispness and gradually scaled off. This observation allows us to put some coins into a sequence over time, based on ongoing attrition and deterioration. It shows that the mint- and date-carrying reverse dies were not paired with one obverse after the other in an orderly sequence, but in a random order during the production cycle. For example, the slow deterioration of the die puts the reverses ART25a (0058), GD37a (0612), ART25a (0059, 0060, 7735, 0061), GD37a (0613), ART25a (0062, 7737, 7738, 7739, 7740), GD37a (0614), and ART37a (0085) in a sequence. The (majority of the) reverse dies were likely already available when the sequence of die no. 13 started, but not all

capital indicating the individual die.

[27] The standard assumption is that for an extended coin series more reverse (upper) dies were used than obverse (lower or anvil) dies. Due to unmitigated direct hammer hits, reverse dies are under a higher pressure and stress than lower anvil obverse dies, where the hit is bolstered by the metal of the flan.

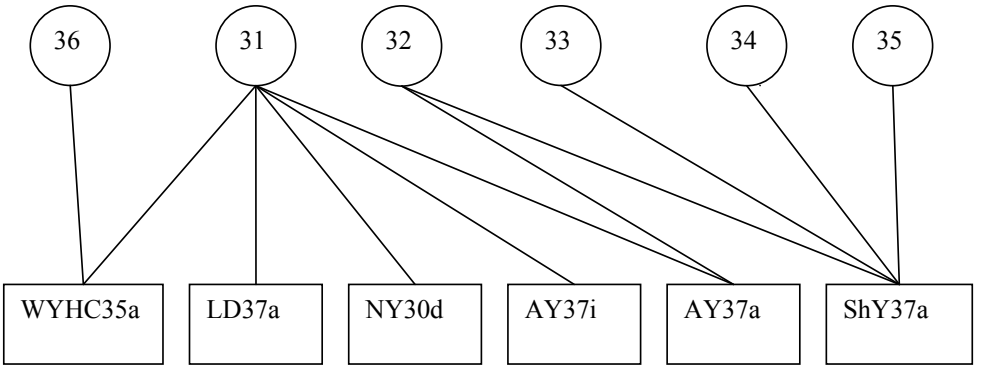


Fig. 3. Die chain 3.

obverse dies were combined with all reverse dies in chain 1. Obverse die no. 17, for example, has so far only been matched with ART26a (7 coins), ART37a (3 coins), and BYSh26a (12 coins).

While the dies of chain 1 all look standard for Khusrō II, chain 3 (Fig. 3) includes as an exception obverse die no. 31. The portrait appears almost like a caricature of Khusrō II, unlikely to have been produced under Khusrō. It is stylistically in line with some of the worst coins for Yazdgard III for *BN* in Berlin VI. Die no. 31 is combined with a large number of unsuspicious reverses AY37a (1 coin), AY37i (1 coin), LD37a (1 coin), NY30d (2 coin), WYHC35a (3 coins), although we have only a few coins of this die in the parcel under consideration. While there are probably newly engraved (specifically awkward-looking) dies, it cannot yet be sufficiently established whether the standard-looking dies are old—from the time of Khusrō II—or later. Without hoard evidence any hypothesis about the production date of these standard-looking dies remains suggestive.

The sequence of the use of dies in chains 3 to 5 (Figs. 3–5) seems more regular, using one die after the other and not in random order, as in chains 1 and 2 (Figs 1 & 2). This impression, however, may be just because in chain 3 only die nos. 31 and 32 link different obverses.

The twenty-four reverse dies of the five die chains are distributed among the mint abbreviations and dates as follows:[28]

Ardashīr Khurra in Fārs
ART25 a; ART26 a, and b; ART33 a; ART37 a, b, c, d, e, and m.

Hormizd-Ardashīr or Sūq al-Ahwāz in Khuzistān[29]
AW31 c; AW35 a.

Ērān Khurra Shāpūr or al-Shūsh? in Khuzistān[30]
AY30 a; AY37 a and i.

Bīshāpūr in Fārs
BYSh26 a.

Gayy (citadel of Isfahān) in Jibāl
GD37 a.

Rayy in Jibāl
LD37 a.

Nihāvand? in Jibāl or Fārs[31] (attribution uncertain)[32]
NY30 a and NY30 d.

Shīrāz in Fārs
ShY37 a.

Veh-az-Andiyōk-Husrū at Ctesiphon in Asōrestān[33]
WYHC28 b; WYHC?30 c; WYHC35 a

[28] The mint abbreviations will be revisited extensively in Tyler-Smith, forthcoming.

[29] Malek 2013: 475.

[30] Malek 2013: 475–76.

[31] For a suggestion of a location in Fārs see n. 55.

[32] Malek 2013: 481.

[33] This abbreviation's location is debated. It has been argued that the abbreviation represents Veh-az-Āmid-Kavādh, Birāmqubādh (later Arrajān) in Fārs. During the reign of Kavād I, and for the later period Veh-az-Andiyōk-Husrū (founded AD 540), on the eastern side of the Tigris within the Ctesiphon agglomeration in Asōrestān, Iraq, basically took over the mint activity of AS, Aspānvar, another city in the Ctesiphon agglomeration; Album and Goodwin 2002: 65–67 (main discussion); see also Daryaee 1999: 149–41; 2003: 196–97; Malek 2013: 483; on the city see Hauser 2007: 463–65.

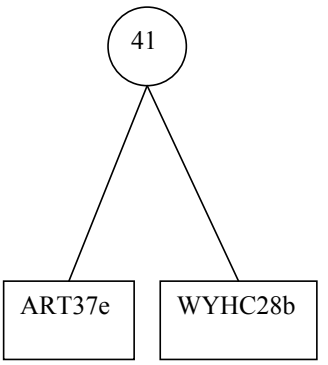


Fig. 4. Die chain 4.

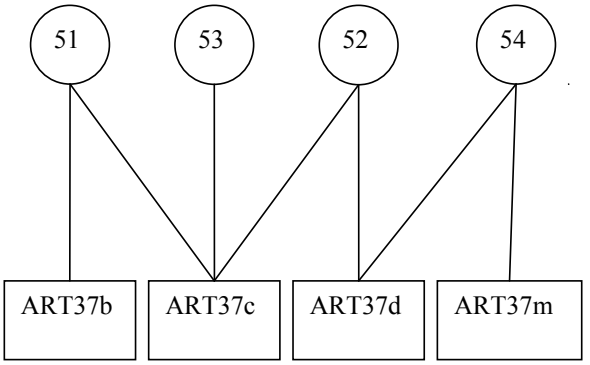


Fig. 5. Die chain 5.

To sum up, on the one hand the workshop producing the oddly die-linked coins was not a regular Sasanian mint operating at the time of Khusrō II, where we can assume regular administrative practices with reliable administrative information. The group suggests a large-scale makeshift operation. On the other hand, this/these workshop(s) was/were definitely operating within the Sasanian minting tradition, with regard to the quality (see below), weight, die axis, and preparation of the flan. The dies were almost all flawlessly engraved, some but not all are in a peculiar style. Although there are blundered exceptions (see die no. 31), the inept engraver understood well all the elements of Khusrō II's portrait. The high number of die duplicates and the crisp condition of the coins suggest that the hoard was composed—in terms of circulation—not long after the coins had left the mint(s), but older contemporary Khusrō II coins were definitely added and *dipinti* applied, leaving some time between the minting and the deposition. It was not a hoard straight from the mint, such as the Bīshāpūr hoard.[34]

IV. THE *BN-GLM-NAL* GROUP OF YAZDGARD III

The analysis of the dies used on the Yazdgard III coins minted in the Kirmānī mints yielded an unexpectedly large output, rivalling in number with those of the die chains of Khusrō II coins. This finding stands in contrast to the judgement of Susan Tyler-Smith based on the limited number of coins available to her in 2000; she concluded: "output, judging by the surviving specimens/dies, appears always to have been low."[35]

Before the Berlin VI parcel appeared, at least six *BN* coins in the name of Yazdgard III could be related with some confidence to the original oddly die-linked hoard, but as always with commercial parcels, this assumption cannot be proved: two coins in the second Berlin parcel (year 12, Berlin II, nos. 0220, 0221; Figure 13), two in the London parcel (year 12 and year *12), and three others offered by dealers known to have acquired parcels of this hoard (all year *12: Los Angeles dealer; 2 coins at Album, Santa Rosa).[36] They were obviously left accidentally among the bulk of seemingly ordinary Khusrō II coins. All coins of Yazdgard *BN* here belong to STS type 10/3[37] and exhibit common features. They all show the abbreviation *BN*, which stands for a yet unlocated mint in Kirmān.[38] All share a reverse type of the late Khusrō II, and have in addition a pellet at the 11.55 h position on the margin, except for one otherwise similar die (BN*12G).[39]

[34] Szaivert 1978–79.

[35] Tyler-Smith 2000: 149.

[36] Persis Gallery, Los Angeles (BN *12; 4.20 g, 34 mm; pellet at 11.55; www.vcoins.com/ancient/persisgallery/store/viewitem.asp?idProduct=938 accessed 8 June 2012); Album 2012b: no. 55 (BN *12, dot at 11.55 h; 4.12 g; Stephen Album acquired hoard material); Album 2012c: no. 32 (BN *12; 3.99g; pellet at 11.55 h). For an additional coin see coll. Robert W. Schaaf (BN *12; 4.01 g; 32mm; pellet at 11.55 h).

[37] Typology by Tyler-Smith 2000.

[38] Mochiri (1985: 117) argues that this mint might be Gwāshīr in Kirmān. This requires an interpretation of the second letter as *g*. Sears's reading of *BN* as *BR* (1997: 133–35; 2003) requires an interpretation of the second letter as an L/R which is not possible; see Album and Goodwin 2002: 54.

[39] That some of Yazdgard's coins even used the style of Khusrō II was already noted by Gurnet (1994: 6 fig. 15).

In year 15 the pellet on the reverse moved to a 9.10 h position.[40] All the Yazdgard coins are in mint condition. Stylistically they all show a slightly blundered portrait of the *shāhānshāh*, except for no. 0220.

The Berlin VI parcel comprised forty-three coins of Yazdgard III, forty of them from the *BN* mint between the years 12 and 14. This collection of Yazdgard coins from the hoard proved to be a positive selection. The other three coins were ST 10 (no. 6043; Figure 14), NAL 13 (no. 6042; Figure 14), and GLM 13 (no. 6041; Figure 14), which probably also belong to the hoard; the latter two are also mints of Kirmān. How can the Berlin VI parcel be connected to the oddly die-linked hoard? First, the occasional occurrence of such Yazdgard *BN* coins in earlier parcels; second, the uncleaned coins shared the same surface colouring, light yellowish clay, and bright turquoise verdigris; third, they feature the same fabric as those coins of the Khusrō II die chains, hatched surfaces in the unstruck parts of the flan, hammered edges, broad flan, and slight craquelure of the surface; fourth, a crisp uncirculated condition; and fifth, one of the Yazdgard coins also shows some ink spills (no. 6021). While none of these observations is conclusive in its own right, they add to the strong assumption that Berlin VI belonged to the oddly die-linked hoard.

The group of *BN* coins in Berlin VI ends with year 14. Susan Tyler-Smith's study showed that the *BN* mint had started under Yazdgard in year 12, which is the earliest year recorded. The *BN* mint continued striking coins in years 15,[41] 16,[42] 17,[43] 18,[44] 19,[45] and 20,[46] suggesting that the closing year 14 of Berlin VI is significant and indicates the real regnal year. Any legible year BN 13 is missing in the hoard and in Tyler-Smith's corpus. The sequence between 12 and 14 seems to be filled with an unusually spelled *12 (see below). While it is conceivable that we have oddly mixed dies of fictitious mint abbreviations and dates, it seems unlikely that any die would mention a date in the future, thus making Yazdgard's year 14 (AD 645–46) the actual closing date, the *terminus post quem* for Berlin VI and presumably for the entire oddly die-linked hoard. In some unknown administrative way the year 14 was important because it was the last with a pellet at 11.55 h, shifting in the following year 15 to a pellet at 9.10 h position on the reverse.

The reading of one year in particular poses a challenge. The year "12" in the usual spelling of *dawāzdah* occurs on eight coins struck with six pairs of dies. Two additional pairs are illustrated in Tyler-Smith's corpus adding up to at least ten pairs.[47] The *d* of the *dah* (ten) is almost a tiny standing leftwards-facing crescent, rather than the usual "*3*"-shaped rendering of the letter *d*. The date can be easily mistaken for a date in the 30s, which would be after the demise of the empire. The largest group of *BN* coins shows a rather unusual rendering of the single digit part of the date. This group comprises thirty-five coins in Berlin VI with at least sixteen obverse and twenty-one reverse dies (Figs 13–14, nos. 6009, 6012, 6016, 6018, 6022, 6025, and 6034). The odd rendering of the year had previously been discovered by Tyler-Smith, who reached the conclusion that it might be read as "16", but firmly excluding any reading in the 30s.[48] The correct reading seems to be *12. The *d* appears as a leftwards open "crescent" not as a "*3*" and is lying flatly on its back. There is one additional "tooth" in the single digit, one more than expected. This additional "tooth" was suggested by Dieter Weber to be read as an "*n*". According to Weber's reading, this word might be read as ***dawānzdah***, parallel to *pānzdah*, fifteen, or *shānzdah* for *shāzdah*, sixteen. Except for these coins, however, there is no parallel Pahlavi source for this spelling as yet. Some modern Kurdish dialects, however, know a *dwānzdah*,[49] so this might be a regional spelling. A thirteen, *sycdah*, which one would expect between the years 12 and 14, and a later sixteen (*shāzdah*), can be excluded on palaeographic grounds. The large numbers of dies corroborate an intentional spelling and

The same coin was also published by Tyler-Smith (2000: no. 137).

40 Tyler-Smith 2000: nos. 44–45; Album 1994: no. 74.

41 Tyler-Smith 2000: nos. 44–45, pellet on the reverse at 9.10 h.

42 Tyler-Smith 2000: no. 52, pellet on the reverse at 9.10 h, tentative reading of the year *sh'zdah*; no. 53, no pellet on the reverse; Classical Numismatic Group 2004: no. 680, no pellet.

43 Tyler-Smith 2000: no. 56, no pellet on the reverse.

44 Tyler-Smith 2000: nos. 59b, no pellets; 60, no pellets, 61, pellet at 11.55 h; Alram 1986: pl. 26, no. 932 (no pellets).

45 Tyler-Smith 2000: nos. 68–83, no pellets on reverse, obv. of no. 77 has four pellets at the 8.55 h position; Gorny & Mosch 2009: no.1583, no pellets on obverse and reverse.

46 Tyler-Smith 2000: nos. 107–23, 177, 178; Album 2014b: no. 80.

47 Tyler-Smith 2000: nos. 33, 34.

48 Tyler-Smith 2000: 150; subsequently Tyler-Smith attributed no. 51a to year 16.

49 MacKenzie 1961: 169, §272. We are grateful to Ludwig Paul, Hamburg, for this information.

writing, excluding any error by the die engraver. The rendering is clearly intended to be set apart from the regular rendering of twelve. There is no gradual shifting toward this inventive spelling and writing. The last year represented for *BN* in Berlin VI parcel was 14. Year 14 is represented by four coins, struck with three obverse and four reverse dies.

One particular obverse die connects a reverse die with the **dwānzdah* epigraphy and a reverse die of year 14 (BN*12L, no. 6034= BN14A, no. 6035; Figure 14), clearly indicating that dies of year *12 were followed by year 14. There are a number of features connecting the unlocated Kirmānī mint of *BN* with the similarly unlocated mint of Garm-Kirmān (abbreviation *GLM*)[50] and *NAL* (possibly Narmāshīr).[51] All three mints share the odd spelling of **dwānzdah*.[52] Tyler-Smith found an obverse die linked with a reverse die of the same odd spelling GLM *12 and a reverse die of year GLM 14.[53] Year 14 followed year *12. The parcel also included a *drahm* of GLM 13 (no. 6044; Figure 14) and of NAL 13 (no. 6042; Figure 14), written in the ordinary way (*sycdah*, with a "*d*"-shaped as a *3*).[54]

Usually GLM, BN, NAL are also distinguished by different obverse types; *GLM* and *NAL* use a portrait similar to that of Khusrō II with a linear merlon (STS type 7), while BN (STS type 5/6/10) with a moulded merlon and three pearls hanging from a ring. Not only does the style of the *12 show that the die cutting was by the same hand, but there is also a surprising obverse die link between GLM 13 (GLM13A, no. 6044; Figure 14) and BN 12 (BN12F, no. 0220; Figure 14). The die linkage suggests a single mint for BN, GLM, and—although conjectural—probably also for NAL (no die linkage yet to BN or GLM).

Tyler-Smith's seminal study on Yazdgard's coinage reveals "random" die linkage almost as a pattern. She discovered a number of "improbable" die combinations among other Yazdgard III coins from Fārs. One obverse die links a NY[55] 30 reverse (STS, no. 171) with an ART 12 reverse (STS, no. 130; uncertain date, possibly 12); another obverse die links NY 31 (possibly 11; STS, no. 173) with reverses of DA 14 (STS, no. 131) and DA 16 (or 36, STS, no. 136).

These observations suggest a completely different mint organisation under Yazdgard III after al-Qādisiyya than under his predecessor, Ardashīr III. Such extensive die linkage points either to an itinerant mint or to a central mint within each province, providing the districts indicated with the abbreviations on the reverse, with coined money, at least for the years *12 to 14 in Kirmān and most likely in Fārs.

V. *DIPINTI* OF THE SEVENTH CENTURY (DIETER WEBER)

In the first Berlin parcel, a substantial number of coins bears ink *dipinti*. For study purposes and in order to broaden the base for any conclusion, the *dipinti* from a parcel of mostly Ardashīr III coins with a closing coin of year 7 of Yazdgard III's reign (AD 638–39) have been added, as well as a random sample of Sasanian *drahm*s mostly from the seventh century.[56] The stylistic features of the Pahlavi script—with the exception of one coin of the Susa hoard (no. 43)—are the same and point to the same period. The dealers acknowledge having seen these *dipinti* and cleaning them off to achieve a bright marketable lustre. *Dipinti* on Sasanian coins are first mentioned by Rika Gyselen in her description of the second Susa hoard in 1977.[57] The closing coin there is a *drahm* of Khusrō II, dated year 38. Sixty coins out of 1171 *drahm*s bear ink marks.

[50] Mochiri (1985: 115) tentatively suggests the capital of Garm-Kirmān Bamm as the mint location; see Album and Goodwin 2002: 54, who doubt the identification with Bamm.

[51] Mochiri (1985: 115) tentatively suggests NAL might refer to Narmāshīr in Garm-Kirmān. This suggestion is confirmed by a newly discovered post-reform Umayyad dirham from Narmāshīr; Shams Eshragh 2013: 57, no. 253. Less evident is the reading of the dirham of the same year with different dies auctioned at Morton & Eden (2013: no. 133).

[52] Tyler-Smith 2000: no. 46 (for NAL); nos. 47–50 (for GLM). Heidemann's photograph file (SB 04024, GLM*12; STS-type 7/3, same dies as a coin in Robert Schaaf's coll.; cf. Tyler-Smith 2000: no. 47; 3.92 g; 3 h; pellet at 11.55); Robert Schaaf coll. (no. 2295; GLM*12; STS-type 7/3).

[53] Tyler-Smith 2000: 150, nos. 49 (GLM *12) and 40 (GLM 14). Yazdgard coins with the "frozen" regnal years 19, 20, and some later dates, usually have an irregular die axis, marking them as immobilised and as much later coin types, probably from the early period after the Arab conquest or from a brief regaining of territories by Sasanian princes; Daryaee 2006–7. The Yazdgard coins here almost all have regular 3 h/9 h die axis, placing them firmly in the reign of Yazdgard III, possibly between AD 642 and 651.

[54] Cf. Tyler-Smith 2000: nos. 36 (NAL13); nos. 37–38 (GLM13).

[55] The mint of NY is not yet located. Considering the hypothesis presented here, it may be a mint of Fārs.

[56] Heidemann 2013. The publication of a second parcel of this hoard with *dipinti* will follow.

[57] Gyselen 1977.

The hoard was preserved in a pottery jar, which protected the ink. We can assume that the oddly die-linked hoard was also protected by a container, preserving the ink and only allowing a light verdigris to grow with a fine yellowish clay dust. Philippe Gignoux studied the *dipinti* from Susa in detail.[58] The writing appears to be titles, words presumably indicating the coin's value in general terms, and names of individuals.

Dipinti as such might have been a frequently encountered phenomenon in the late Sasanian and post-Sasanian world and a common way of marking coins. *Dipinti* are known from China where a coin of Pērōz was discovered with a "Hephtalite" ink inscription, and from the western border of the Sasanian Empire. The early Islamic hoard from Qamishlī in Syria, preserved in the Bibliothèque Nationale, includes a Khusrō II *drahm* (WYH, year 29) with a Syriac ink *dipinto* naming an individual *Yohannan*.[59] A parcel of a hoard of Arab-Sasanian coins[60] recorded by the author in 2005 and also two single recorded Umayyad dirhams[61] feature *dipinti* but are as yet unread. Graffiti, probably serving the same purpose, are well known on Sasanian *drahm*s and dirhams of the early ʿAbbāsid period.

The ink on some coins (nos. 4005, 0619) was analysed by Oliver Hahn at the Bundesanstalt für Materialforschung und -prüfung in Berlin.[62] Because of the extremely thin layer, the ink could only be identified as basic Indian ink, but could not be dated; nor could the binding agent be determined. Some multispectral images (nos. 0160, 0210, and 0286; Figure 14) were taken at the University of Hamburg. Due to the properties of silver as writing material, the images revealed nothing more than what could already be read with a magnifier or photos taken with high resolution.[63]

All *dipinti* were beyond any doubt applied by trained seventh-century hands. Indeed, we are able to narrow the time window by the *ductus* of the Pahlavi script. Because of their similarities with the script on Pahlavi Papyri from Egypt (e.g. *dipinti* catalogue nos. 7 and 8),[64] we know that some *dipinti* belong to the first half of the seventh century, while some belong to the second half of the seventh century, judging by their complete correspondence to the current cursive *ductus* used in the documents of the so-called "Pahlavi Archive",[65] which must be dated mainly between AD 660 and 700.

The meanings of the words represented by the *dipinti* show a great diversity: proper names (*dipinti* catalogue nos. 11, 18, 19, 24, 25, 28, 34, 40), simple nouns or adjectives (nos. 3, 7, 10, 12, 14, 20, 23, 24, 26, 27, 29, 30, 32, 41), and some words and phrases with specific Zoroastrian content:[66]

— patronymic *Mazdagān*?[67] (no. 13)
— *Dēn-windād* personal name? (no. 23)
— *xʷastūg* "confessing, believing" (no. 27)
— *dēn-abzōn* "increase of the (Good) Religion" (no. 12)
— *Dādfarrox* personal name (no. 40)

Most of the *dipinti* edited by Gignoux[68] cannot be verified because of the poor quality of their reproductions, but one coin stands out: Gignoux no. 43; it is written in Book Pahlavi script (and not in the current cursive) and reads as follows: *mazdēsn frasp ī dēn* "Mazda-worshipping [is] the beam of the (Good) Religion". The coin was struck during regnal year 29 (AD 618–19) at the *AY* mint, probably al-Shūsh in Khuzistān. This *dipinto* was thus applied between AD 618–19 and 628, the closing date of the Susa hoard. This coin is so far the only known example with Book Pahlavi, which was otherwise used exclusively for Zoroastrian texts. All other known Pahlavi *dipinti* reveal a different form of cursive script that has to be dated to the decades in the middle of the seventh century.

It is thus possible to narrow the window even more precisely. First, the Pahlavi script must have been developed by AD 600 at the latest, based on the fully

58 Gignoux 1978.

59 Gignoux 1978: 137, 138, 146, pl. XI, coin no. c (Khusrō II, WYH 29); the hoard is published in Gyselen and Kalus 1983.

60 For *dipinti* on Arab-Sasanian coins, the 2005 hoard (coin numbers refer to photos on file at the Oriental Coin Cabinet Jena), coins nos. 1 and 2 (Khusrō II, SK, year '48 '), coins 5 and 6 (al-Muhallab ibn Abī Ṣufra, DA 76 H.), coins 7 and 8 (al-Muhallab ibn Abī Ṣufra, BYSh 75 H.), coin 9 (ʿUbaydallāh ibn Ziyād, DA, YE 45), coins 10, 11, 12 (ʿUbaydallāh ibn Ziyād, BCRʾ, 56, 60, and 59), and coin 13 (ʿUbaydallāh ibn Ziyād, KRMʾN 56 H.). All coins are unpublished.

61 Heidemann's photograph file, Dirham, mint Wāsiṭ, 95 H. (Photo SB 09999), and 96 H (Photo SB 09998).

62 Our thanks to Oliver Hahn of the BAM, Berlin for this information.

63 September 2013. We are grateful to Boryana Pouvkova and Claire Rachel MacDonald from the Centre of the Study of Manuscript Cultures at the University of Hamburg.

64 The catalogue of *dipinti* uses a different numbering system.

65 Weber 2008: xiv–xv; for a precise dating, which is now possible, see Weber 2012.

66 For the transliteration of Pahlavi words, brackets ⟨ and ⟩ are used, for their transcription italics are used.

67 The transliteration here follows the use in Persian studies.

68 Gignoux 1978.

developed vernacular cursive applied on Pahlavi papyri and parchments from Egypt (AD 619–29), before the invention of the Avestan script which derives from Pahlavi.[69] Most of the *dipinti* were written in cursive Pahlavi and applied on coins of Khusrō II, contemporaneously or some time after his reign.

Second, the cursive script used in everyday life was more or less uniform from the time of Khusrō II up to the end of the seventh century AD. This uniformity is documented by the latest dated texts in the so-called "Pahlavi Archive".[70] Internal evidence of this archive[71] leads to the assumption that the *dipinti* here were very probably written before the middle of the seventh century.

In this respect, the word *x*^{w}*adāyīg* "Sir" (no. 26) is informative. The distinct style in which it is written moves it closer to the script (AD 619–29) of the Egyptian papyri than to documents from Iran proper (late seventh century). The Iranian documents always have a very cursive *ductus* but never reveal the distinctive writing style of the characters of the first quarter of the seventh century. The same feature occurs in *dāšn* "gift" (no. 7) where again the writing is close to that on Egyptian papyri. This may also be assumed for *x*^{w}*astūg* "confessing, believing" (no. 27) although this word is not attested in other seventh-century documents. The *dipinto* (no. 8) *wahāg* "trading or value" is well documented throughout the seventh and even early eighth centuries.[72] Nevertheless, it shows clear accordance with examples from Zoroastrian documents from Egypt, particularly with regard to the initial *aleph*.

Catalogue nos. 9, 30, 34, 37, 40, and 41 should be interpreted in the same way. This brief survey allows us to conclude, despite the limited number of samples, that the script of the *dipinti* is the one used in the first half of the seventh century. The earliest possible date is of course the regnal year indicated on the coins of Khusrō II, and the latest date, based on stylistic attributes, is *c.* AD 650. This interpretation may also be corroborated by the name *Bōrānduxt* (no. 3), which is clearly an allusion to Queen Bōrān (r. AD 630–31), because her name is not at all common.

There is only one *dipinto* (no. 31) that obviously reveals traces of a script of Aramaic origin, probably Sogdian, which runs from right to left.[73]

VI. METAL ANALYSES (JOSEF RIEDERER)

The aim of the metal analyses was first to establish or reject the authenticity of the oddly die-linked coins; and second, to investigate whether there is any detectable pattern that might hint at peculiarities of the mint. Analyses of Sasanian silver coins remain rare.[74] The basis for any comparison remains the large series of Sasanian *drahm*s tested by Adon Gordus with neutron activation, published in 1972. In a rather summary fashion, analyses of 2500 Sasanian silver coins were compared with Umayyad coins tested earlier by Earle R. Caley (1957). Gordus re-evaluated his own results in 1995.[75] A study of twenty-two coins, using X-ray fluorescence (XRF) technology, was recently published by Sodaei *et al*.[76]

XRF analysis was applied on the forty coins within the five die chains, nine coins from the Berlin II and Berlin III parcels that were (as yet) unconnected to the chains, and four coins from Yazdgard III, *BN* mint. The coins were irradiated with X-rays, stimulating the ele-

69 See Weber, forthcoming: chapter II.

70 For the "Pahlavi Archive" see Weber 2008: xiii–xv. The exact dating has now been verified in Weber 2012.

71 As will be described in Weber, forthcoming: chapter I.2.

72 E.g. in a letter (private collection Iran) from the year 96 (if PYE = 757 CE).

73 We are grateful to Nicholas Sims-Williams for his expertise. It is a Sogdian script read from right to left. Several letters are ambiguous. Whatever way it is read, the result remains a previously unknown word. For the first letters there are several possibilities: z$^{\flat}$z-, z$^{\flat}$n-, zx-, zγ-, less likely n$^{\flat}$z-, n$^{\flat}$n-, nx-, nγ-. The last three letters are clearly -cty (apparently with a small gap between c and t). It is risky to try to interpret an unknown word without context, but it might be worth considering the possibility that this form is the oblique plural (ending -ty) of an ethnicon (suffix -c) formed from a place-name which could be written z$^{\flat}$z-, z$^{\flat}$n-, or any of the other possibilities already mentioned. Such a word could be translated "for the people of Zaz (or Jaz, Zan, Jan, Zakh, Jakh, Zagh, Jagh, Naz, Naj, Nan, Nakh, Nagh)".

74 A thorough analysis of a large group of Khusrō II *drahm*s is expected to be conducted within the Austrian Sylloge series.

75 Gordus 1972, 1995; Bacharach and Gordus 1972; Caley 1957; the analyses by A. Gordus are used by other scientists with some caution, because of his methodology. Although he used standard technology, he did not always get below the layers of surface enrichment. For cleaned coins he will always obtain a higher silver content.

76 Sodaei *et al.* 2013; the results of the twenty-two coins tested show an exceptional low ratio of lead and copper. Because all coins were cleaned with formic acid before testing, these components could have been washed out from the surface and are thus less represented.

ments to transmit their own specific X-ray wave. This process allows those elements to be identified, along with their relative proportion within the tested surface area. The composition of the surface, however, might differ from the actual metal composition, for reasons which might include a certain finishing after striking, either by washing the coin in an acidic solution for surface enrichment or modern cleaning with acids. In general the coins here were not cleaned before the XRF testing. The coin also might have been dipped into mercury, a method used in antiquity to increase the coin's brightness.[77] The accuracy of X-ray fluorescence analysis decreases with diminishing concentration of the tested constituents. Data of the alloy's main components are reliable, whereas the accuracy for elements with concentrations lower than 1% is limited. The coins tested are as follows:

Die chain 1
0063 – obv. 11–ART25a
0057 – obv. 12–ART25a
0062 – obv. 13–ART25a
3002 – obv. 13–ART25a
0067 – obv. 15–ART26b
0082 – obv. 15–ART37a
0068 – obv. 16–ART26a
0083 – obv. 16–ART37a
0230 – obv. 17–BYSh26a
3003 – obv. 17–ART26a
3004 – obv. 17–ART26a
3009 – obv. 17–ART37a
0086 – obv. 18–ART37a
3010 – obv. 18–ART37a

Die chain 2
0128 – obv. 21–AW35a
7744 – obv. 21–AW31c
0075 – obv. 22–ART33a
0076 – obv. 23–ART33a
0135 – obv. 23–AY30a
0126 – obv. 24–AW35a
0127 – obv. 25–AW35a

Die chain 3
3079 – obv. 31–WYHC35a
0486 – obv. 32–ShY37a
0154 – obv. 32–AY37a
0483 – obv. 33–ShY37a
0485 – obv. 34–ShY37a
3071 – obv. 35–ShY37a
0568 – obv. 36–WYH35a

Die chain 4
0093 – obv. 41–ART37e
0541 – obv. 41–WYHC28b

Die chain 5
0088 – obv. 51–ART37b
3011 – obv. 51–ART37c
3014 – obv. 51–ART37b
0090 – obv. 52–ART37c
3012 – obv. 52–ART37c
0091 – obv. 53–ART37c
0096 – obv. 53–ART37g
0092 – obv. 54–ART37d
3013 – obv. 54–ART37d
0094 – obv. 54–ART37m

Coins with regnal year "38"
The latest coins of the Khusrō II share were dated year 38. These coins could not (yet) be linked to the established die chains. As a hypothesis, some features, such as puffy round letters, suggest that they might belong to the coins of the die chains. The results were that no. 0587 has too high a gold content to belong to the silver batch used for the coins of the die chains. No. 0588 leaves that possibility still open.

0587 – WYHC38A–a
0588 – WYHC38B–b

Coin AW 33
A stylistic "feel" suggested that this coin might belong to the workshop, but it could not be linked with any die chain. The gold level, however, again seems to be too high to support such an assumption, casting serious doubts on the method of a stylistic "feel" to distinguish coins from the oddly die-linked chains from regular issues.

3036 – AW33C–b

Random specimens
These coins were selected from the Berlin II parcel with one from Berlin III. Berlin II seems to be largely composed of parts of the original hoard divided by surface colouring and sand residue but, based on the differences in their metal content from the established die chains, these coins seem not to be connected with the chains.

0134 – AY29A–a

[77] The mercury content was not subtracted from the general composition, although it was probably only a surface element. Subtraction would have elevated the silver content only slightly, but would not have caused any significant change to the other trace elements.

0210 – BN26A–a
0116 – AW30A–a
0202 – BBA37B–e
0282 – GD33A–a
3080 – WYHC35H–g

Yazdgard III – BN mint
These coins are not included in the graphs, only within the tables.

6002 – BN12A–a
6010 – BN*12A–a
6012 – BN*12A–b
6030 – BN*12F–p

For all coins (Table 1), the silver-copper ratio, the traces of gold, and other metallic components are within the parameters of previous analyses of Sasanian silver coins by A. Gordus.[78] The coins are all authentic Sasanian *drahm*s. According to Gordus's results, the silver content for *drahm*s of Khusrō II and for *drahm*s of the period after AD 400 ranges between 85 and 100%. The silver content of the sample from the die chains ranges between 83 and 92.5% with an average of 89.2% and the fineness of most of the other coins is very close. Four coins from different mints and dates, which are neither die-linked nor supposed products of the workshop(s) in question here—no. 0210 (93.5% Ag), no. 0202 (93.38 %), no. 116 (93.02 %), and no. 0134 with 92.5% Ag—stand out because of the degree of silver fineness. The average fineness of the random sample coins is thus slightly elevated, at 91.3%. These unconnected coins, stylistically and technically, were clearly struck in the time of Khusrō II. This supports the idea that the Khusrō II coins of die chains form a distinct group.

The group of unlinked coins is closely followed by the four coins of the Yazdgard group. Nos. 6002 (BN 12) and 6030 (BN*12) are extremely close in their metal composition in general. Even closer are nos. 6010 and 6012 (BN*12), which not only share the same obverse die but also have virtually identical metal compositions.

Lower than the unlinked coins but still in the same range of silver content are three of four coins from die chain 2. Coins of chain 5 seem to have the widest spread of compositions among the five chains: no. 3014 (obv. die 51–ART37b) has a silver content as low as 83.8%, which is significantly lower than that of the rest, but coins struck with the same obverse die are also at the top, middle, and bottom range of the silver content chart (chain 5; no. 0088, 3011, 3012). This diversity shows the possible latitude within one group of dies, that is, within the same line of production.

The copper content ranges between 3.7 and 15.5%. Apart from the high copper content of nos. 0090 and 3014 (both chain 5), which in turn is responsible for their low silver content, and the copper-poor but silver-rich coins nos. 0210, 0202, 0116, and 0134 (Fig. 6), the copper content of the coins is close to an average of 7.55%, while the unlinked coins here have an average of 6.09%, almost the same as Yazdgard's coin from BN (6.08%). Gordus[79] also includes in his study an early Umayyad coin (Wāsiṭ, 85 H/AD 704–45) with a copper content of 4 to 6%, suggesting that high copper concentrations are not uncommon for some mints.

For the period between AD 500 and 629 the peak for the gold content within Gordus's sample lies at about 0.7% within a range of 0.2% to 1.2%, corroborated by the recent findings of Sodaei *et al.*[80] The gold content of the die-linked sample (Fig. 7) has an average of 0.31% and varies considerably over the whole range between 0.07 and 0.58%, which is significantly lower than the peak of coins struck in the period of Khusrō II. The average gold content of the unlinked coins is higher at 0.69%, corresponding to Gordus's average finding of the gold content of the Khusrō II *drahm*s. The extremely low values between 0.07% Au of nos. 3012 (chain 5), 0127 (chain 2), 0076 (0.08%, chain 2), and 0.09% of no. 0092 (chain 5) appear unusual, but Gordus also found *drahm*s of Hormizd IV and Khusrō I with a figure as low as 0.02% gold. In general, a high gold component corresponds to silver-rich coins, but not always. For example no. 0090 (chain 5) has an above average gold content (0.55%), but a low silver content (82.53%). Eight out of ten coins that are not linked with any die chain yield the highest gold content, between 0.68 and 1%. Exceptions are the unlinked coins no. 0116 with just 0.25% Au and no. 0588 with 0.40% Au. Yazdgard's *BN* coins follow the rule that a high silver content corresponds to a high gold component. They follow the unlinked coins, and contain the highest average with 0.62%, significantly higher than the average gold content of chain 1 with

[78] Sodaei *et al.* (2013) show a slightly higher silver average, probably due to the cleaning method and its reducing effects on copper on the surface.

[79] Gordus 1972.

[80] Gordus 1972: 135–37; Sodaei *et al.* 2013: 212.

	Ag	*Cu*	*Au*	*Pb*	*Sn*	*Zn*	*Sb*	*Bi*	*Hg*	*Fe*	*Chain*
0086	85.66	11.63	0.34	1.27	0.51	0	0.18	0.02	0.06	0	1
3003	88.88	8.62	0.50	1.20	0.20	0.14	0.19	0.03	0.07	0.03	1
3004	88.90	8.20	0.47	1.61	0.23	0	0.23	0.11	0.06	0.01	1
3002	89.22	7.75	0.57	1.81	0.13	0.04	0.20	0.06	0.09	0	1
0062	89.91	7.39	0.54	1.66	0.17	0.09	0.15	0.09	0.07	0.16	1
3009	91.00	6.11	0.43	1.57	0.30	0.04	0.18	0.13	0.08	0	1
0057	90.67	5.64	0.20	2.56	0.06	0.03	0.22	0.05	0.14	0.21	1
0063	89.42	7.59	0.41	1.72	0.01	0.05	0.18	0.06	0.08	0.13	1
0067	91.26	6.08	0.26	1.54	0	0.06	0.20	0.09	0.08	0.09	1
0068	90.11	7.02	0.45	1.55	0.19	0.03	0.19	0.10	0.06	0.12	1
0082	90.19	7.06	0.42	1.36	0	0.07	0.19	0.05	0.08	0.15	1
0083	89.37	7.14	0.32	2.32	0.05	0.06	0.16	0.06	0.08	0.09	1
0230	89.69	7.04	0.33	2.08	0.17	0.05	0.17	0.03	0.03	0.22	1
3010	92.45	4.55	0.58	1.21	0.27	0.02	0.20	0.08	0.05	0	1
0126	90.49	5.82	0.37	1.96	0.50	0	0.19	0.11	0.08	0.14	2
0127	91.76	5.30	0.07	1.56	0.44	0	0.20	0.06	0.07	0.19	2
7744	91.96	4.95	0.41	1.12	0.52	0.08	0.22	0.05	0.04	0	2
0128	91.98	5.12	0.23	2.14	0.05	0.03	0.18	0.10	0.06	0.08	2
0075	88.08	8.56	0.11	1.50	0.23	0.03	0.19	0.04	0.06	0.12	2
0076	92.19	5.64	0.08	1.01	0.10	0.06	0.16	0.08	0.17	0.31	2
0135	88.50	8.74	0.21	1.45	20	0.04	0.19	0.09	0.07	0.31	2
0486	87.72	9.85	0.45	0.78	0.49	0	0.20	0.02	0.04	0	3
3071	88.08	10.32	0.18	0.35	0.14	0	0.19	0.002	0.05	0	3
0154	88.56	9.19	0.31	0.75	0.40	0	0.19	0.02	0.07	0.19	3
3079	89.39	8.77	0.29	0.90	0.11	0.02	0.16	0.04	0.04	0.021	3
0483	89.53	8.35	0.19	0.99	0.18	0.07	0.20	0.03	0.04	0.11	3
0485	87.09	10.40	0.20	0.89	0.22	0.03	0.18	0.04	0.05	0.49	3
0568	88.87	7.84	0.46	1.45	0.20	0.06	0.18	0.02	0.06	0	3
0541	86.52	10.61	0.34	0.93	0.60	0	0.17	0	0.05	0	4
0093	89.16	9.09	0.32	0.28	0.45	0	0.20	0.06	0.03	0	4
3014	83.76	14.25	0.20	1.18	0.17	0.002	0.18	0.03	0.08	0.002	5
3012	88.60	9.59	0.07	1.10	0.11	0.01	0.18	0.009	0.06	0.031	5
3011	89.80	8.20	0.18	1.10	0.26	0.20	0.19	0.002	0.05	0.04	5
0088	90.95	7.29	0.29	0.92	0.12	0.01	0.16	0.04	0.08	0.34	5
0096	91.00	7.19	0.22	0.45	0.5	0.05	0.19	0	0.03	0	5
0090	82.53	15.53	0.55	0.53	0.17	0.04	0.20	0.02	0.04	0.20	5
0091	88.28	9.63	0.22	1.20	0.20	0.04	0.19	0.03	0.07	0.03	5
0092	88.32	9.87	0.09	0.50	0.49	0	0.25	0	0.03	0	5
0094	90.29	7.90	0.14	0.48	0.48	0.07	0.22	0	0.05	0	5
3013	89.63	7.64	0.45	0.67	0.46	0.12	0.22	0.02	0.04	0.08	5
Δ_1	89.24	8.17	0.31	1.24	0.75	0.04	0.19	0.05	0.06	0.10	
6002	92.10	5.70	0.64	0.67	0.28	0.05	0.16	0.05	0.05	0.16	Yzd
6010	91.00	6.50	0.51	0.97	0.36	0.12	0.18	0.04	0.07	0.18	Yzd
6012	90.70	6.70	0.62	0.63	0.39	0.06	0.18	0.05	0.06	0.52	Yzd
6030	92.05	5.40	0.69	0.80	0.37	0.05	0.16	0.05	0.05	0.30	Yzd
Δ	91.46	6.08	0.62	0.77	0.35	0.07	0.17	0.05	0.06	0.29	
3036	87.03	10.31	0.68	0.59	0.20	0.09	0.17	0.03	0.03	0	AW 33
0587	91.28	5.55	0.76	0.92	0.16	0.03	0.19	0.05	0.05	0.34	WYHC 38
0588	90.09	7.02	0.40	1.20	0.22	0.02	0.17	0.03	0.08	0.21	WYHC 38
3080	89.26	9.12	0.66	0.37	0.08	0.06	0.17	0.03	0.03	0	WYHC 38
0282	91.62	5.47	0.84	0.72	0.47	0.04	0.18	0.06	0.04	0	GD 33
0134	92.75	5.23	0.80	0.80	0.14	0.02	0	0.01	0.06	0.02	AY 29
0116	93.20	4.34	0.25	0.60	0.42	0	0.20	0.05	0.11	0.52	AW 30
0202	93.38	3.66	0.80	1.02	0.47	0	0.19	0.06	0.04	0	BBA 37
0210	93.47	4.14	0.98	0.77	0.09	0.02	0.18	0.05	0.07	0.21	BN 26
Δ	91.34	6.09	0.69	0.87	0.25	0.031	0.16	0.04	0.06	0.14	
Δ_{all}	**90.04**	**7.55**	**0.42**	**1.00**	**0.32**	**0.036**	**0.18**	**0.043**	**0.06**	**0.095**	

Table 1. Metal composition of all coins tested: first group, coins of the die chains; second group, coins of Yazdgard; third group, unlinked coins.

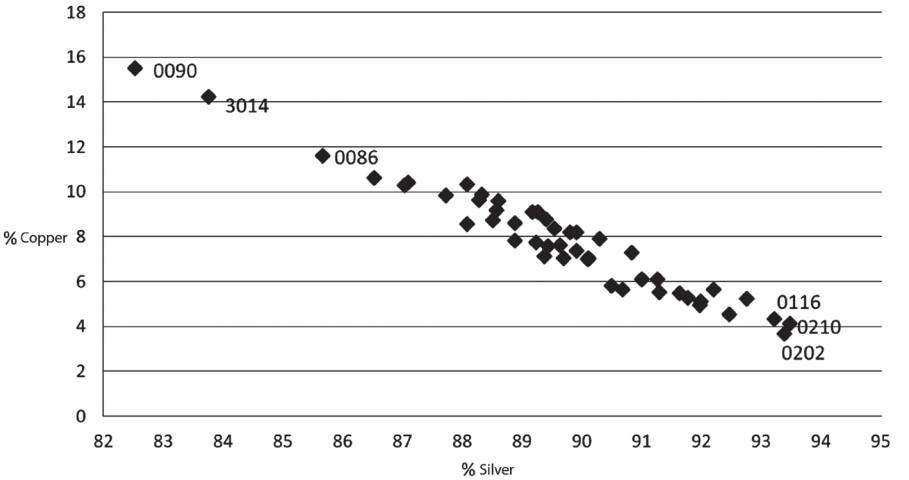


Fig. 6. The silver-copper ratio of the Khusrō II coins shows a significant concentration in the central region. (The Yazdgard coins are not plotted in this figure). The outstanding values of the coins on the right side of the graph (nos. 0210, 0202, 0116, 0134) have a slightly higher silver content than the rest of the coins. They are not linked to the die chains. The one on the left side with the significantly higher copper content (no. 3014) is from chain 5, which also has die duplicates ranging in the middle region of silver content.

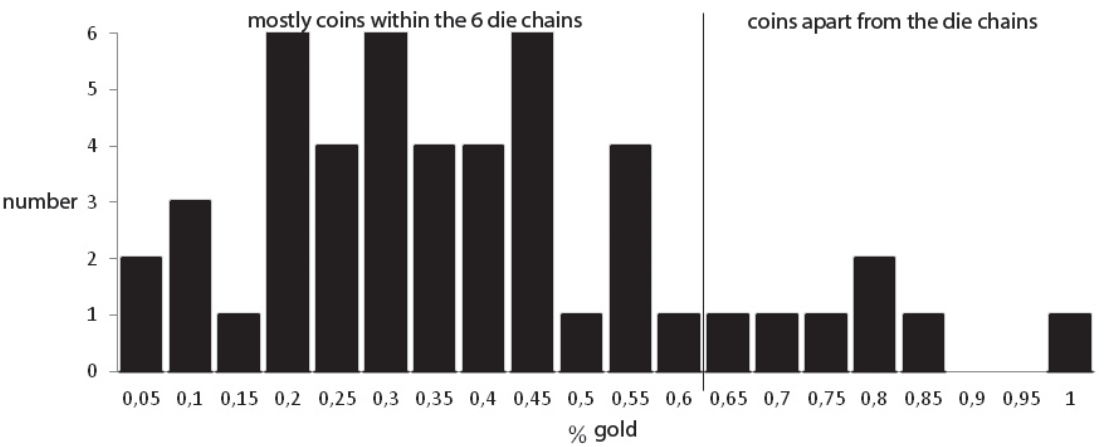


Fig. 7. Gold content of the Khusrō II coins.

0.42%, the chain which has an almost equally high gold content for some of its coins.

Among the chains there are differences in the gold content (Fig. 7). Ten out of fourteen coins of chain 1 have a comparatively high gold value, between 0.34 and 0.58%, while two coins of chain 5 (die no. 54) have some of the lowest with just 0.07% and 0.09% of gold. At the bottom of the ranking are also coins of chains 2 and 5. They spread between 0.07 and 0.45%. An exception appears to be no. 0090, with a high gold content and an exceptionally high copper content (chain 5, 83% Ar, 16% Cu, 0.55% Au). The differences in the quality of the silver used in the chains suggest that distinct batches of silver were processed in the workshop(s) for the oddly die-linked coins.

In sum, the silver batches processed in the (so far) five die chains are, in spite of all their differences, close enough to suggest that their silver source(s) is/are distinct from the majority of silvers processed in the period of Khusrō II; most noteworthy is their lower gold content. Nevertheless, they are in the range of what to expect from authentic Sasanian silver coins, used by more than forty mints during the thirty-eight years of Khusrō II's reign. The findings show that the

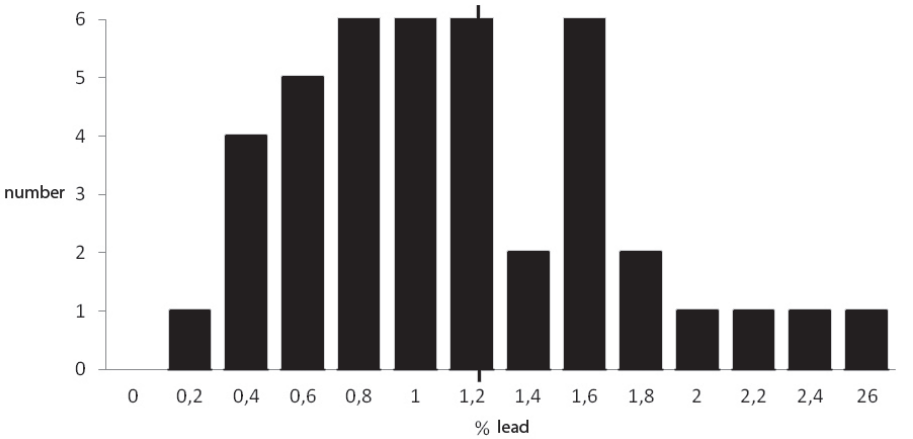


Fig. 8. Lead content, without Yazdgard's coins. To the right of the black line at 1.2% the high lead content of chains 1 and 2.

coins of the chains are not only stylistically close but also similar in terms of processed batches of silver compositions. The silver of the Yazdgard's BN coins is, despite their obvious similarities in fabric and style, slightly different from the silver batch used for the Khusrō II coins.

A look at the other trace elements is revealing too. In principle they support the results already given. Caley found the lead (Pb) content in Umayyad dirhams to be between 1 and 2% combined with a low tin content. This picture is consistent with the results from the present sample.[81] The lead content of the present coins (Fig. 8) ranges between 0.3 and 2.6%. It is remarkable that all eleven coins from chains 1 and 2 yield the highest lead content—between 1.1 and 2.6% (with highest contents in no. 0057 [2.6%], 0083 [2.3%], and 0128 [2.1%])—with only four intruders into this range league from chain 5 (0091, 3014, 3012, 3011, with 1.1 to 1.2 % Pb). This proves again how close chains 1 and 2 are in their metal composition. At the lower end of the spectrum, below 0.50 %, we find various coins from chains 3, 4, and 5. The unlinked coins and also the coins of chain 5 show the widest spread in the chart without a specific concentration. Although the unlinked coins are not representative, they have a much lower average lead content. Yazdgard's *BN* coins are again distinct, being in between, with an average of 0.62%.

The antimony (Sb) component within the chains lies in the narrow range between 0.15 and 0.25%, with most of the coins close to the mean value of 0.19%. The unlinked coins have a slightly lower antimony content. No. 0134 (unlinked) contains antimony below the detection limit of the X-ray fluorescence method. The antimony content in the three coins of die no. 54 is expectedly close, with the highest value at 0.22% and 0.25% Sb. Six of the other seven coins of chain 5 are also close together in the middle range (0.16 to 0.20 %). The coins of chain 5 also share an extremely low bismuth (Bi) content and a low lead (Pb) content. Yazdgard's *BN* coins are within this range with an average of 0.17%.

Looking specifically at the bismuth (Bi) content within the chains, we find a general spread between 0.0 and 0.13%. At the top, above 0.9%, are eight coins of chains 1 and 2 (nos. 3004, 0062, 3009, 0067, 0068, 0126, 0128, 0135), but coins of these chains go even as low as 0.02% (no. 0086). At the lower end, below 0.009, we find mostly coins of chains 3, 4, and 5. Bismuth ranges below detection in coins nos. 0092, 0094, 0096, and 0541. Coins struck with die no. 54 are virtually without bismuth, but some coins of chain 4 even go up to 0.06% and of chain 3 and 5 to 0.04%. Yazdgard's *BN* coins are very close together between 0.04 and 0.05%, corroborating the hypothesis that they form a distinct silver batch. Again their bismuth content is close to that of the unlinked coins.

Values for tin (Sn) range between 0.0 and 0.60% (Fig. 9). It appears that there are two peaks, one below

[81] Caley 1957: 213 table III; also in Gordus 1972: 137–38; Sodaei *et al.* (2013) found almost no lead in their twenty-two tested coins, which might be due to the cleaning of the coins with formic acid.

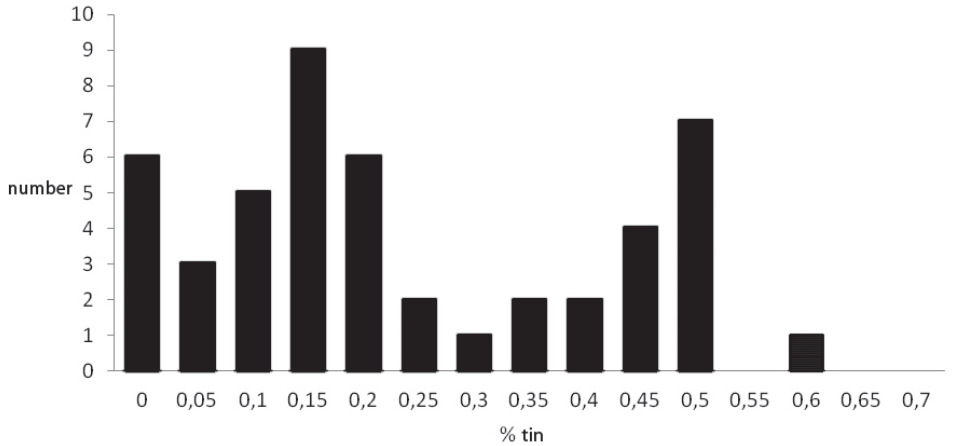


Fig. 9. Tin (sn) content of Khusrō II coins.

0.3% and one with values above 0.4%. Thirteen of the fourteen coins of chain 1, four of the seven coins of chain 2, five of the seven coins of chain 3, and six of the seven coins of chain 5 are in the lower category. In the upper category and especially rich are the two coins of chain 4 and the three coins of die no. 54. Generally the average tin content is higher among the coins of the chains, than among the unlinked coins. With an average of 0.35%, Yazdgard's *BN* coins again fall just in the middle.

The mercury content (Hg), ranging between 0.03 and 0.11%, does not show any significant feature. Whether the mercury content on the surface was enriched through the process of silver extraction and refining or by surface enrichment to increase the gloss of the coin cannot be determined. Pieter Meyers, who analysed Sasanian silver bowls, found mercury concentrations between 0.0 and 0.01%, whereas most values were less than 0.0001%. This suggests that the relatively high mercury level may be the result of mercury surface enrichment to brighten the coin's silver lustre.

The figures for zinc and iron[82]—where measurement has a high margin of error—do not show any conspicuous value. It should be noted, however, that Yazdgard's *BN* coins are relatively rich in iron within the range of the tested coins, thus proving again that they are from a distinct batch.

In conclusion, it is possible to state that the entire sample is Sasanian silver of the seventh century (Tables 2 & 3).[83] We can discern patterns among the chains, indicating the use of distinct silver batches. Chains 1 and 2 are rather diverse in mint abbreviations and dates. Most of the die-linked coins come from these two chains. The silver content of chain 1 rises, with 89.8%, only slightly above average. The coins of chain 1 have a high lead (Pb, 1.2–2.6%), and bismuth (Bi, 0.02–0.13%) content, and a slightly elevated content of gold and zinc. Some coins of chain 1 also have a relatively elevated gold content, between 0.2 and 0.58%, but this value is significantly lower than many unlinked coins, presumably contemporaneous coins from the period of Khusrō II. The composition of the coins of chain 2 is similar to those of chain 1, with its high lead (Pb, 1.0–2.14%) and bismuth content (Bi, 0.04–0.11%). The silver content in chain 2 is slightly higher at 90.7% than the average, but the gold is slightly lower. The only coins that have a higher silver and gold content than that of chain 1 and 2 are the unlinked coins.

Chain 3 appears rather indistinct with six obverse and six reverse dies distributed over a number of mints, but does not (yet) include any ART dies. The composition yields slightly less silver than the average but more copper, and also slightly less of the other trace elements, than coins in chains 1 and 2.

Close together, in a number of respects, are the

[82] Confirmed by Sodaie *et al.* (2013).

[83] Gordus 1972, 1995. The metal composition (neutron activation) for the silver bowls in the Metropolitan Museum of Art is slightly different, the silver content is usually a little bit higher as is the gold content; Meyers 1981: 161–62.

Δ 2	90.71	6.30	0.21	1.53	0.29	0.03	0.16	0.08	0.08	0.16
Δ 3	88.46	9.25	0.30	0.87	0.25	0.03	0.19	0.025	0.05	0.116
Δ 4	87.84	9.85	0.33	0.61	0.53	0	0.19	0.03	0.04	0
Δ 5	88.32	9.71	0.24	0.81	0.30	0.05	0.20	0.015	0.05	0.072
ΔYzd	91.46	6.08	0.62	0.77	0.35	0.07	0.17	0.05	0.06	0.29
Δ UL	91.34	6.09	069	0.87	0.25	0.031	0.16	0.04	0.06	0.14

Table 2. Means of the coins within the chains and those that are unlinked, in the sequence of their silver content.

	Ag	*Cu*	*Au*	*Sn*	*Pb*	*Zn*	*Sb*	*Bi*	*Fe*
Chain 1			high		very high	high		very high	
Chain 2	very high				very high			very high	very high
Chain 3	low								
Chain 4				very high		very low			very low
Chain 5			low			high	high		
Yzd	very high		very high			high	low	high	very high
un-linked	very high		very high				very low	high	very high

Table 3. Aggregated values in comparison.

coins from chain 4 and 5. At the present stage of research chain 4 includes only one obverse die linkage ART37 and WYHC28 reverses, while chain 5 currently includes only coins of ART 37. Chain 4 distinguishes itself by an elevated tin content but no traceable zinc content. All coins from die 54 (ART 37) were definitely struck from the same batch of silver, with an expected narrow distribution of results. Chain 4 distinguishes itself by high values for antimony (Sb) and tin (Sn) while the values for gold, lead, and bismuth are the lowest in the entire group. Die chain 5 is much more diverse and erratic in its composition. The two chains are close in copper and gold content (Au, die 54 = 0.09–0.14%, rest of chain 5 = 0.07–0.29%). Chain 5 has some extreme values for the copper with 14.3% (3014) and 15.5% (0090). Chain 4 has an equally high copper content and a tin content (Sn, chain 4 = 0.45–0.60%) that is only comparable to some coins of chain 5, namely coins of die 54 (Sn = 0.46–0.49%), which ranges clearly above the tin content of the other chains. Production of the three chains 3, 4, and 5 involved a generally similarly composed batch of silver that is slightly distinct from the batches of chains 1 and 2. These differences do not necessarily also indicate different workshops, despite the different chains.

Yazdgard's *BN* coins, which share many features in the fabric with the coins of the five die chains, form a distinct, tight group in the metal composition, suggesting a different batch of silver. In many regards, with their high silver and high gold content, they are closer to the unlinked coins but nevertheless distinct.

Despite general similarities in metal content among all chains, and slight differences in each of them, it is remarkable that the analysis filters out those coins that cannot be linked to the chains (0116, 0134, 0202, 0210, 0282, 3080, 3036, 0587, 0588) and presumably were indeed contemporary of Khusrō II. The main differences are their higher silver and gold content, which is on a par with those coins struck under Khusrō II from other metal analyses. Coins nos. 3080, 3036, 0587, and 0588 which seem to have some stylistic resemblance to some of the coins within the die chains (puffy round letters) have all, except no. 0588, a higher gold content than any of the die-linked coins. Either they belong to a quite different batch or they are also contemporary coins from the time of Khusrō II. Presently the latter seems more likely.

The metal composition of the coins of the five chains stands out by its consistency, supporting the hypothesis that we are dealing with the same workshop or related group of workshops continuing the coin production of the time of Khusrō II.

VII. EXCURSION: FURTHER MATERIAL EVIDENCE FOR THE USE OF *APD*

The meaning and use of APD has frequently been discussed. There are hoards with overwhelmingly APD coins[84] and some with only a few.[85] In general more coins without APD were produced than coins with APD. Two observations on the Berlin II parcel should be mentioned, which have not yet been included in the general discussion or published: the erasure of APD on dies, and on coins, and the sharing of the same reverse die by an APD obverse and a non-APD obverse (of coins outside the die chains). These features should be noted here, although their relevance will probably be more apparent when more evidence is collected to establish the administrative meaning of APD. APD was used on coins at the time of Khusrō II from regnal year 12 to 38, parallel to a series of non-APD coins. There is no significant difference in the metal content, both coins were circulating together. Clearly APD had an important administrative meaning, although this is not yet known to us, and it barely influenced their circulation. Later Sasanian emperors did not use APD on their coinage. While APD is scratched out on one die (die no. 32; Figure 11, no. 0486), no other coin within the die chains and almost none in the hoard-related material of the Berlin II parcel have an APD in the margin. Can it be that the unknown administrative reason for APD was no longer applicable for coins of Yazdgard III, and APD coins were contemporaneously sifted out, for whatever reason?

On obverse die no. 32 the once clearly legible letters APD were erased on the die itself.[86] Die no. 33 (Figure 11, nos. 0482, 0483), is linked to reverse dies AY37a and ShY37a (Figure 12, nos. 0154, 0482), both of which are stylistically so close to each other that the same die engraver's hand can be assumed to be responsible for both dies.[87] Erased APDs on dies are not yet published but are known from coins outside the present hoard in at least five instances (for example Figure 13, no. 7754).[88] More often APD, certain mint marks or features are scratched out directly on the coin itself.[89] Among the mint marks it most often happened to the abbreviation *BBA*, the court mint, for unknown reasons.[90] Crescents on the obverse are found to be erased.[91] This signifies that APD continued to have an important meaning, so that someone found it necessary to scratch it out on the dies and even on the coins themselves. Die no. 32 figures among the die chains believed to have been struck in the mid-640s. The erasure on die no. 32 might be a hint for the use of older dies from the time of Khusrō II and that APD was no longer applicable at the time of the striking.

Two instances of a reverse sharing an APD and a non-APD obverse are found among the coins of the Berlin II parcel. Coins nos. 0048 and 0049 share the

84 For example the Vēh-Ardašīr hoard published by Göbl (1973), and the 1976 Susa II hoard published by Gyselen (1989). The Bīšāpūr hoard, which came probably straight from the mint also contained only AFD coins; Szaivert 1978–79.

85 Recently Malek 2013: 464–68, with references to preceding literature; Gurnet 1999 with a complete analysis of the hoard material; Gordus 1972: 146. Susan Tyler-Smith's forthcoming book will discuss this matter in detail.

86 The reading was carefully checked: the "*A*" and the "*D*" are clear, and a *lillāh* can be firmly excluded

87 The obverse die no. 32 combined with ShY 37 (no. 0486) shows a Pahlavi *D* clearly, while the obverse on AY37a (no. 0154) shows more wear of the *APD* mark.

88 Photo SB 07651 (Khusrō II, AT, year 17, APD erased on die); SB 10484 (Khusrō II, GD, year 30, APD erased on die); SB 7754 (Khusrō II, GD, year 32, APD erased on die; Figure 13); SB 03406 (Khusrō II, LD, year 23; APD erased on die); SB 01371 (Khusrō II, WYHC, year 17, APD? erased on die). A curious piece of evidence is a silver plated coin MY, year 20, with an faintly visible APD, scratched out on the die (SB 11016).

89 Khusrō II (Photo SB 09510; AW 35; slightly blundered; APD carefully scratched out); (Photo SB 04029; AW 37; slightly blundered, possibly a contemporaneous forgery; APD scratched out); (Photo SB 08886; AY 20, APD scratched out on coin; presumably early Arab strike); (no. 0250 of the present group, DA 29, dies C-c; APD scratched out), (Photo SB 02862; DA 29, different dies; APD scratched out); (Photo SB 07752; GD 14, APD carefully scratched out on coin); (present hoard no. 0312, LAM, 16, APD scratched out), (Photo SB 08973; NAL 23, APD scratched out); (no. 0429; NY 30, APD [?] scratched out on coin); (Photo SB 09731, WYHC 13, APD erased on coin) (present hoard no. 0616, YZ 37, D scratched out, presumably to make it look like a *lillāh*). Later also the *bismillāh* in the margin was occasionally scratched out for examble "Khusrō II-type", BYSh 25 (Photo SB 09604, coin type of Album and Goodwin 2002: no. 110).

90 Erased mint marks: (no. 0182 of the present group, BBA 25, dies C-c); (no. 0184 of the present group, BBA 28, dies A-a); (Photo SB 09409, BBA 28); (no. 0188 of the present group, BBA 30, dies C-c); (Photo SB 09562, BBA 31), (no. 0199 of the present group, BBA 36, F-f, erased by pecking); (no. 0205 of the present group, BBA 37, dies E-d), (Photo SB 08888; BYSh 24, erased). Ardashīr III: (Ardashīr parcel II, photo no. 6868; BYSh 2, erased, dies F-e; published in Album 2014b: no. 64).

91 Crescent and stars are erased on the obverse of Hormizd IV, regnal year 2 (photo file no. 02793).

same reverse indicating AM 17 (Figure 12, nos. 0048 and 0049), but have different obverses, no. 0048 with APD and no. 0049 without APD on the die. Neither belongs to the die chains and they are probably contemporaneous coins of the period of Khusrō II.[92] The same sharing of an APD and a non-APD obverse can be found on coins no. 0252 and no. 0253 of DA (Darābjird in Fārs), regnal year 33—also unlinked to the established die chains (Figure 13, nos. 0252, 0253). The die engraving, however, is slightly blundered, suggesting that they might be products of the time of Yazdgard III. The sharing of the reverse die—presumably already at the time of Khusrō II—indicates that APD and non-APD obverse dies were probably used at the same workshop and that APD does not set apart production facilities.[93]

VIII. DATING THE DIE CHAINS AND THE HOARD

The previous sections have established a mint or closely related workshops within the Sasanian minting tradition, but clearly not bound to an administrative regulating structure existing under Khusrō II. We have also established for Kirmān under Yazdgard a single mint for the abbreviations *BN* and *GLM*, probably also including NAL, at least for the years *12 to 14. The metal composition and the same pattern of "odd die links" connected the Yazdgard coins from Kirmān to the Khusrō II chains. When and where were the die-linked coins struck? Regnal years and mint abbreviation are obviously not applicable for dating the coins and locating the actual mint. The die-linked Khusrō II coins were struck after the rupture of the regulated Sasanian minting system, as we know it to have been in existence at least until year 4 of Yazdgard's reign (AD 635–36), a rupture probably connected directly or indirectly with the battle of al-Qādisiyya in AD 635. They were either struck within Yazdgard's remaining territories or outside the realm of Yazdgard's authority, where the regional authorities were uncertain about the future of the Sasanian throne.[94]

The latest date on the coins of the die chains is regnal year 37. Coins of the period between the assassination of Khusrō II and the accession of Yazdgard III are missing among the inventories of the known related parcels.[95] If we make the standard assumption, that the mints closer to the final date of a group are represented with more coins and more frequent die-links, then certainly the *BN* group of Yazdgard provides us with a clue, placing the die chains close in time to the *BN* group. In other words, the entire die-linked group of Khusrō and Yazdgard coins might have been struck in the years leading to the closing date, which is year 14 (AD 645–46). This leaves a possible window for the chains between AD 635 and 636, the rupture of the minting system after the battle of al-Qādisiyya, and as a *terminus post quem* AD 645–46, the closing date.[96] We should also bear in mind that this particular STS type 10/3 of Yazdgard's coins first appeared in regnal year 10 (AD 642–43), after the fatal battle of Nihāvand in AD 642.

The coins of the die chains are not Arab issues of Sasanian type as they lack any markers, such as a random die axis; the predominance and immobilisation of the years "19" and "20", which were mostly applied

[92] The obverse die AM17B (w/o APD) is also linked to different reverse of the same mint and year outside the oddly die-linked hoard and its parcels (photo file SB 08715), indicating that nos. 0048 and 0049 are likely to be from the time of Khusrō II.

[93] On some posthumous "Yazdgard III" issues of *NAL* "20" and *BN* "20", Tyler-Smith noted that a word that she read as *jayyid* was erased on the obverse margin (STS, nos. 90–92, 122–23), but whether on the die or on the coins could not be determined.

[94] Al-Ṭabarī Tārīkh I: 2208–12 [beginning of the report, starting with the building up of troops late year 13]; 2289 [Muḥarram 14, Sayf ibn ʿUmar]) dates the battle to year 14 H/early AD 635. According to Pourshariati (2008: 220–23, 469), the battle dates to the year AD 635, which is in accordance with the disruption of the imperial minting system after year 4 of Yazdgard's reign; see Tyler-Smith 2000: 146–47. James Howard-Johnston in his commentary dated the events of al-Qādisiyya three years later to January 638 (Sebeos 1999, 2: 245) without taking the Arab and numismatic sources fully into account; see also Wiesehöfer 2010: 112. Supporting Howard-Jones's view, al-Ṭabarī (Tārīkh I: 2210) reports a note about the enthronement of Yazdgard to ʿUmar, who became Caliph in 13/634. Given that al-Qādisiyya was in the year 3 of Yazdgard's reign, this would mean AD 637–38 for the battle. This argument would also get its support from a different dating of the battle in al-Ṭabarī Tārīkh, I: 2377. See Donner 1981: 212, n. 207 (p. 340 lists the different dating attempts of this event in the historiography). But the 'traditional' date of AD 635 is corroborated by the succession of *shāhānshāh*s within the numismatic evidence.

[95] For the Ardashīr parcel see n. 7.

[96] The entire group of oddly die-linked coins might briefly post-date the *BN* group.

after the Arab invasion; the arm position of the priestly attendants which is always correct, the right arm over the left arm; the application of a lower *drahm* weight; and the striking of the Sasanian style coinage by the new Arab authorities, which left their written mark on the coins.[97] Another important method of dating hoards and coins with "frozen" or "fictitious" dates of the closing coins is by looking at parallel hoard evidence. In the case of commercial parcels this does not yield much additional information.[98]

The use of old Khusrō II dies at the time of Yazdgard is further substantiated by a Khusrō II die (old or new) in the *GLM* mint. On the obverse the name is recut to an almost illegible Yazdgard. The reverse (STS type 3) shows the pellet at 11.55 h and the oddly written **dwānzdah*, regnal year 12 (Figure 14, GLM *12; no, SB 04024).[99]

To sum up, the oddly die-linked Khusrō II coins might have been struck in the period after the battle of al-Qādisiyya in AD 635 (regnal year 3–4), the disruption of the Sasanian minting system in Yazdgard's realm, or more likely after the battle of Nihāvand in AD 642 (regnal year 10), the year of the presumed introduction of the Yazdgard-type 10/3. There are no positive arguments to assume a production of the chains under Khusrō II proper or under Arab authority. Supposedly the Khusrō II die chains and the Yazdgard coins of *BN 12* to *14* are almost contemporaneous. The coins of the die chains would then have been struck in the years before or even shortly after the closing date AD 645–46 (regnal year 14 of Yazdgard).

IX. LOCATING THE HOARD, THE MINT, AND THE DIE ENGRAVING

This coin hoard has been variously referred to by dealers and scholars as the "Silk Road Hoard" or "Tokharistan Hoard".[100] Both names assume an eastern origin. The parcels of Berlin, California, and Moscow can be tentatively traced to a Central Asian supply chain. Discussion about the location of the unrecorded find must be kept separate from discussion about the location of the accumulation of the coins, the mint of the oddly die-linked group, and the die engraving.

The Yazdgard III coins of *BN* and *GLM*, and possibly including *NAL* belong to one single centralised workshop. The workshop of the Khusrō II chains is closely related to it, at least in time, even if not in sequence. Stylistically most of the dies of the Khusrō II chains are of a standard quality, better than most of the obverse dies from Ardashir III and the already cited obverse die of Khusrō II (Figure 14, no. SB 04024) for Yazdgard III. This might suggest that many dies might already have been old at the time of the striking, but still fresh in terms of wear. We know from Tyler-Smith's study that old dies from´Ardashīr III and the already cited obverse die of Khusrō II (Figure 14. no. SB 04024) were reused and altered for Yazdgard's output.[101] The erasure of the now obsolete APD on one Khusrō II die (die no. 32; Figure 11) might be a further hint to the usage of old dies, where the obsolete administrative information was intentionally erased, presumably at the time of Yazdgard. But even if the Khusrō II dies are contemporary with Yazdgard III, it must be borne in mind that those craftsmen, who might have engraved new Khusrō II dies, could have

97 Nikitin and Roth 1995.

98 Very few hoards are known to have been buried after AD 628. The one from Susa I in Fārs with 2278 coins is the only one that has surfaced in a controlled excavation. While most of the coins of the Susa I hoard are from the reign of Khusrō II (95%), its *terminus post quem* is year 3 of Yazdgard III (AD 634–35), some years earlier than we suggest for the oddly die-linked hoard. Year 3 is the last year before the effects of the battle of al-Qādisiyya disrupted the normal procedure of the Sasanian minting system, as evidenced by Tyler-Smith. The Susa hoard also contains material of intermediate rulers, such as Ardashīr III (29), Bōrān (7), Hormizd V (36), and Khusrō V (3). The hoard was published by Unvala (1934) and he mentions two coins of Khusrō III. This error is corrected by Allotte de la Fuÿe (1934: 86). A further hoard, kept at the Cabinet des Médailles in Basel, spans from Khusrō I to Khusrō V, with a majority of Khusrō II, Hormizd V, and Khusrō V coins, but no coins of Ardashīr III, Yazdgard III, or the two queens; Gyselen 1990. The possibility that these visually distinct coins were extracted from the hoard being studied should be strongly considered here.

99 Heidemann's photo file (SB 04024, GLM*12; STS-type 7/3, same dies as coin in Robert Schaaf's coll.; cf. Tyler-Smith 2000: no. 47; 3.92 g; 3 h; pellet at 11.55 h.); Robert Schaaf coll. (no. 2295; GLM*12; STS-type 7/3, same dies as SB 04024).

100 Between 2009 and 2013, Stephen Album, a dealer who allegedly acquired coins from the oddly die-linked hoard, repeatedly offered extremely blundered coins of the Khusrō II type on his website and in his catalogues. The suggestive description implies a connection with a "Tokharistān hoard" or similar. Most of these coins could not be connected with the coins in the die chains.

101 Tyler-Smith 2000: 143–44.

had the same design carved a number of years earlier under Khusrō II himself.

In the time of Khusrō II, we have to assume at least a regulated central engraving office. Whether the dies were sent out to the mints, as in the middle ʿAbbasid period,[102] or the coins were also centrally minted and sent then off to provincial capitals, should be considered.[103] A general proxy-indicator for the first practice are re-engraved mint abbreviations on dies, which were obviously sent to the wrong receiving provincial authority and recut there with the correct mint abbreviation. We have such indicators for the time of Hormizd IV[104] and Ardashīr III,[105] but re-engraving of mint names have not yet (?) been established for any major mint abbreviations of Khusrō II.[106] An indicator for the latter practice of a centralised minting is occasional "impossible" die linkage between an obverse and two reverses with abbreviations of different provinces or districts. This might point to a travelling workshop or more probably a centralised minting and shipping of the struck coins to the districts named on the coins. We have such proxy-indicators in Yazdgard's post-al-Qādisiyya/Nihāvand scenario. If we assume old dies were used for the odd die linkage, the origin of the dies from such a central mint is likely (or their transfer to a central mint). In a system of central die engraving the same stylistic features naturally occur on dies for a number of mints. This would explain certain similarities in style among the Khusrō II dies. Whether the dies for the die chains have been collected from different mints in the aftermath of al-Qādisiyya, or retrieved from a central die-engraving office or a central mint working for a number of provinces, or perhaps newly engraved by an experienced old die engraver in the period of Yazdgard remains, however, conjectural. Some of the caricature-like portraits of Khusrō II point to an engraving of at least some dies in the period of Yazdgard III and to a shortage of Khusrō II dies (as well as of experienced die engravers when those were needed). Without much evidence to hand, it looks as though a stock of dies was supplemented with newly engraved, sometimes odd-looking dies.

We have established that the mint abbreviations of the Khusrō II die chains cannot be taken at face value. The stylistic similarities of many dies advocate a central die cutting, the random die linkage of a single workshop. The mint abbreviations might nevertheless offer some additional clues about where these dies/coins came from or what kind of dies/coins were available as models when dies were later engraved. Methodologically, without any hard evidence, any conclusion remains conjectural. The nine mint abbreviations of the chains involve only western Iranian mints of the provinces of Fārs, Khuzistān, and the Jibāl, and a mint in the urban agglomeration of Ctesiphon.[107] Most dies show abbreviations from the province of Fārs (ART, 9 dies; BYSh, 1 die; ShY, 1 die) with an exceptional number of nine dies for Ardashīr Khurra (ART). Second is neighbouring Khūzistān (AW, 2 dies; AY, 3 dies), third Jibāl province (GD, 1 die; LD 1 die) and central Iraq (WYHC, 2 dies); and two dies from the as yet unlocated NY mint (probably in Fārs[108]). Fārs and Khūzistān are also those regions producing coins for Yazdgard III in his first three years, although the mints of the die chains and the Yazdgard coins do not match.[109] For an eastern or Central Asian origin of dies or minting, or even a place where the original hoard was assembled, one would expect to find at least some coins within the parcels of eastern mints such as Sistān

[102] Ilisch 1984.

[103] In the Roman period and possibly also for early Syrian copper coins of the Islamic empire, it is discussed and in some instances proven, that coins were struck at a central mint and then sent to the place which is named on the coins; this is indicated by "impossible" die linkages.

[104] Heidemann's photo files: SB 08209 (Hormizd IV, MY 11, recut from another mint abbreviation); SB 06257 (Hormizd IV, YZ 2; YZ re-engraved AT or AM), SB 08227 (Hormizd IV, ShYT [*sic*] 12, recut of a ShY to an ART?).

[105] Heidemann 2013: no. 5. (APL 2, mint recut (?) two teeth or ʾ before L); no. 7 (ART 2; dies A-a; recut ST ?, year 1). Second parcel of the same hoard: ART 2 recut ST (?), year 1 (dies B-b; nos. 6806, 6809, 6810; dies C-b: no. 6808); AYL 2 recut AH 2? (dies D-d no. 6848; K-d no. 6855). Gurnet 1994: fig.10 (ART 2, recut ST ?, year 1, different dies).

[106] Mochiri (1998) describes a similar phenomenon for Khusrō II. He published five die-identical coins of Khusrō II mentioning the unlocated mint LY of year 15, which is die-linked with a reverse of an equally unidentified mint LAN, year 23. The three coins of LAN 23 share two different obverse dies. Because of the rarity of both mint abbreviations, they seem to be local and perhaps forgeries. This phenomenon is probably contemporary with Khusrō II.

[107] This distribution pattern does not coincide with Pourshariati's division of the empire into a northern Pahlav part and a southern and western Parsig part.

[108] See n. 55.

[109] Tyler-Smith 2000: 154 (LAM, PYL, LYW BYSh, ART, ST, DA). From this point of view ST is noticeably missing as an abbreviation in the chains, and the mint of Ctesiphon (WYHC) is missing from the known mints of Yazdgard.

(SK), presumably prolific under Yazdgard III,[110] or Marw (ML), prolific under Khusrō II (but suspiciously unknown for Yazdgard III),[111] within the chains or at least within the fully recorded Berlin II parcel, which was closest to the composition of the original hoard. The abbreviations of the Khusrō II die chains fall into the main areas of Yazdgard's first coinage of the years 1 to 4—Khūzistān, Fārs, Jibāl, Central Iraq—while Yazdgard's own coins in the hoard almost all originate from Kirmānī mints.[112] This observation makes a Central Asian location for the workshop of the Khusrō II dies and the assemblage of the original hoard unlikely, and a workshop for the coins of the chains in south-western Iran (possibly Fārs) or (presumably) in Kirmān more likely.

X. A POSSIBLE HISTORICAL SCENARIO

The battle of al-Qādisiyya took probably place in Yazdgard's third regnal year, or AD 635.[113] The fall of the empire's administration ensued with a prolonged Arab siege and the final capture of the capital Ctesiphon in year 16/637.[114] The disruption of the empire after al-Qādisiyya is evident from Yazdgard's coinage, with the cessation of most of the mint activity by his third regnal year and with a last regular issue in Kirmān (*NAL*) minted in year 4.[115] The sudden cessation of all mint activities in the provinces makes a centralised minting under Yazdgard III even before the battle of al-Qādisiyya and the siege of Ctesiphon likely, but cannot yet be corroborated without further evidence. After the battle Yazdgard, who was still a minor,[116] was brought to Azerbaijān, accompanied by the treasures of Ctesiphon.[117] According to Sebeos (second half of the seventh century AD) the Arab armies intercepted the flight—probably in the context of the battle of Jalūlāʾ[118]—and appropriated treasures, perhaps the treasures carried from Ctesiphon.[119] After the battle of Jalūlāʾ, Iraq was permanently lost. According to al-Ṭabarī, at the time of the battle of Jalūlāʾ Yazdgard was at Ḥulwān; he fled via Iṣfahān, heading for Iṣṭakhr in Fārs, the traditional stronghold of the dynasty.[120]

The first major attacks on Fārs occurred in 19/640. They resulted in the *tamṣīr* of Ṭawwāj in 21/642 as a major Arab garrison, but a complete occupation of the province could not yet be achieved. The Sasanian strongholds Iṣṭakhr and Jūr (Ardashīr Khurra) prevented the Arab armies from moving eastwards until 29/650.[121] In the late Sāsānian period, Fārs was rich in financial resources.[122] At the time of the battle of Nihāvand (AD 642),[123] Yazdgard probably stayed in the Kirmān region.[124] Central Iran, notably Kirmān, had been protected from the Arab armies for a while. Al-Balādhurī mentions that Yazdgard defeated an Arab army under Mujāshīʿ ibn Masʿūd al-Sulamī and Harim ibn Ḥayyān al-ʿAbdī in Kirmān in wintertime, strengthening his position.[125] One of al-Ṭabarī's sources noted that Yazdgard remained in Fārs for four years, in Kirmān for two or three years, and in Sijistān for five years, but this might be conjecture. Whatever the case, Yazdgard stayed in Kirmān for an extended period of time, which is corroborated by numismatic sources. In Kirmān, he faced some sort of internal resistance by the *dihqān*s because of unspecified fiscal

110 Tyler-Smith 2000; 137 mentions coins of Yazdgard III from SK (Sakastan) as being relatively common. Heidemann's own observations over the past 20 years cannot confirm this. Tyler-Smith's observation might come from a single hoard entering the market from a number of angles at the same time, during her research.

111 Only one coin from Berlin II parcel (no. 0366) seems to come from the original hoard, the rest have a different surface colouring.

112 Tyler-Smith 2000.

113 For the dating of the battle of al-Qādisiyya see n. 94.

114 Tabarī n.d., II: 2451.

115 Tyler-Smith 2000; Pourshariati 2008: 222. The information on the coin from NAL year 4 was kindly provided by Susan Tyler-Smith.

116 At his accession he was probably just eight years old, see references in al-Ṭabarī 1999: 409, n. 1014.

117 Balādhurī 1866: 263; 1916: 418.

118 Porshariati (2008: 235) disputes the dating of the battle, which might have happened in year 16/637.

119 Sebeos 1999, 1: 99; 1999, 2: 245–46; Miles 1960: 86.

120 Al-Ṭabarī n.d., II: 2561, 2562; Balādhurī (1866: 315: 1916: 490) abbreviated these years up to Nihāvand in two sentences and described it as a flight (*haraba Yazdgard*) from Madāʾin (Ctesiphon), to Ḥulwān to Iṣbahān, and after Nihāvand to Iṣtakhr, which is not an appropriate description for the time and the resources mobilised; Pourshariati 2008: 235.

121 Balādhurī 1866: 315: 1916: 490; Hinds 1984: 42, 42, 46, 47; see also Album and Goodwin 2002: 67–69.

122 On the economy of Fārs see Daryaee 1999.

123 Al-Ṭabarī n.d., I: 2596–2637, dates it to 21/641–42; Pourshariati 2008: 241.

124 Pourshariati 2008: 246.

125 Balādhurī 1866: 315; 1916: 490.

measures.[126] The Muslim victory at Nihāvand meant that an invasion of the Iranian plateau was imminent. The conquest of Kirmān probably started in the year 23/644, approximately Yazdgard's 13th regnal year.[127]

While minting in Kirmān had started earlier, the workshop with the crucial abbreviation *BN* began minting in regnal year 12 (AD 642–43), after the battle of Nihāvand. The latest datable coins of *BN* related to the oddly die-linked hoard from regnal year 14 (AD 645–46), covering three years. They were exactly the years in which Yazdgard had to mobilise all resources for the defence of Kirmān. It seems reasonable to assume—until further information is available—that these mint activities are related to such efforts, and that the closing year is thus connected with the enfolding conquest of Kirmān in some unknown way. It would make sense that he relocated for an unknown period of time in order to regroup, possibly to Sijistān as al-Ṭabarī's source presumed.

Coins were struck in his name in *BN* and in Kirmān between regnal years 10 and 20 (AD 642–51).[128] As late as *c.* AD 649–50, Yazdgard turned to Khurāsān and Marw finally ceding Kirmān to the Arab invaders.[129] In his chronology (22 H/AD 642–43), al-Ṭabarī misplaced a series of events, which must have happened later in Khūrāsān, more precisely in Marw at the end of the decade: Yazdgard had indicated to his Persian followers (*ahl al-fārs*)[130] that he wanted to defect either to the Turkic Khān or to China. The *ahl al-fārs* reminded him that he was in possession of significant treasures, which he should hand over to them before he left. After a fight, they seized the treasure from Yazdgard, before he could flee to Farghāna. The treasures were then handed over to the Muslim *amīr* Aḥnaf.[131] Those treasures—if there is any truth in this story—were most probably accumulated in Fārs or in Kirmān, after the imperial treasures of Ctesiphon were lost.[132] No coins of the mint of Marw (ML) are known for Yazdgard. Despite Yazdgard's establishment in Kirmān, Marw and large part of Khurāsān had already slipped Sasanian authority for almost 20 years and were ruled by regional powers.[133] Yazdgard's flight to Marw was already to foreign land's outside his realm. This explains much of the circumstances of his end in Khurāsān.

Kirmān is further east than any of the nine named mints of the Khusrō II die chains. Kirmān, nevertheless, was presumably the region where the hoard was finally accumulated. The metal composition of the Yazdgard *BN* coins and the coins of the Khusrō II die chains are close enough to suggest one workshop or closely related workshops, but produced from different batches of silver. Evidence points to a single central mint or travelling workshop, the first producing the Khusrō II die-linked coins and followed or paralleled by a production of Yazdgard coins for the Kirmānī districts *BN*, *GLM*, and perhaps including *NAL*. A central mint for the three Kirmānī districts in those years would emphasise the tight fiscal measures by Yazdgard in Kirmān as reported in al-Ṭabarī.

The preponderance of dies with abbreviations of Fārsī mints among the coins of the odd chains, the presumed production of most of the Khusrō II die-linked coins in Fārs or more likely in Kirmān, the final *BN-GLM-NAL* group, and the assumed destination of the hoard somewhere in the east of the empire suggest a narrative—admittedly conjectural and not (yet) provable—of the original production of the coins of the hoard and their fate. Let us suppose that the hoard is in some unknown way related to the circumstances of the movement of Yazdgard III across his empire and beyond to Khūrāsān. The supposed size of the hoard and the closeness of the mints to each other suggest a link to the treasury. After the loss of the treasures on his retreat to Azerbaijan and his relocation in Fārs, Yazdgard might have been able to collect revenues in silver bullion in that province. On his flight he might also have seized some old Khusrō II dies (perhaps even brought them from Ctesiphon), which were later used in the workshop or related workshops for the oddly die-linked Khusrō II group. An alternative narrative might be a production of the oddly die-linked Khusrō II coins in Fārs or Kirmān before the establishment and acknowledgement of Yazdgard in Fārs and

[126] Al-Ṭabarī n.d., I: 2872, 2876 (Yazdgard demanded a pledge [*rahīna*] from the *dihqān*s); cf. Balādhurī 1866: 315; 1916: 490.

[127] Al-Ṭabarī n.d., I: 2703–5.

[128] Tyler-Smith 2000: 159–66; Pourshariati 2008: 246.

[129] Pourshariati 2008: 244–45, 257–60, 469; Daryaee 2002.

[130] Pourshariati (2008: 257–58) identifies them with Khurasanians, but the reasons are not obvious.

[131] Al-Ṭabarī n.d., I: 2688–89: "*Idh huwā amrun ʿaẓīmun min khazāʾini ahli fārs* (At that time he had possession of the tremendous treasuries of the Persians)." Pourshariati 2008: 257–58.

[132] Tyler-Smith 2000: 148–49, on the special role of Kirmān within the minting history of Yazdgard; Pourshariati 2008: 223; 244–46, 257–58 on the flight of Yazdgard after the battle of al-Qādisiyya.

[133] The last known coin of a Sāsānian ruler was struck by Ardashīr III (ML 2, Heidemann 2013: no. 39).

Kirmān; in other words in regions still within Sasanian territories which did not (yet) acknowledge Yazdgard or did not know who might have assumed the crown of the *shāhānshāh* after the battle of al-Qādisiyya, the siege of Ctesiphon, and the battle of al-Jalūlā'. In this scenario the reasons might have been pragmatic: Sasanian authorities were undecided whom to support, but had to mint large quantities of silver for the regional defence. The resulting coinage had to be widely acceptable in circulation. Anonymous coins for an interregnum are unknown in Sasanian minting. In this scenario, the posthumous use of Khusrō II dies would indicate the undecided situation in the Sasanian southwestern provinces after the battle of al-Qādisiyya.[134] Coins of the *BN-GLM* (probably including *NAL*) group were also struck in quantities, with large numbers of dies with dates ranging between regnal years 12 and 14, when Yazdgard was still in firm control of the province. The large numbers of Kirmānī coins rival with the peak of known annual die productions at the time of Khusrō II, despite the present rarity of those coins.[135] This surge in coin production might illustrate the enormous quantities of money marshalled for the defence after Nihāvand. Despite the vast output by the odd die chains and the Kirmānī issues of the years 12 to 14, these coins do not seem to have gone into wider circulation, resulting in their current scarcity. Perhaps they were largely kept together and melted down at some stage, possibly after their seizure in the wake of the Arab conquest. Although the coins of the die chains and the Yazdgard coins are in mint condition, they had changed hands before they were hidden. Contemporary coins of Khusrō II, not connected with the mentioned workshop(s), were added to the hoard. The *dipinti* suggest some circulation and individual marking after the coins had left the mint. The survival of the ink suggests that the coins were stored in a dry container, possibly a jar similar to the one in which the Susa II hoard was kept. The main assembling phase of the hoard might have ended in Kirmān province, when the invasion of the province was in full swing. The coins might have been transferred, however, to a different place and finally might have reached Central Asia at an unknown time. Whether this transfer is related to the move of Yazdgard to Khurāsān in *c.* AD 649–50 cannot be inferred.

XI. THE CONSEQUENCES FOR SASANIAN NUMISMATICS

Under the successor Ardashīr III, we can still infer a central die cutting with a proliferation of dies to the various provincial mints of the empire. The mint administration might have changed at the latest after the battle of al-Qādisiyya or under Yazdgard III. The coins from Yazdgard's *BN-GLM-NAL* complex and the *NY-DA-ART* complex suggest a central provincial mint (perhaps even travelling mint) in Fārs and in Kirmān, using different abbreviations, or more likely the proliferation of coins instead of the dies from the central mint to the districts of the province, which are named in the abbreviations. This phenomenon is known for other periods and regions in numismatic history, notably for Imperial Asia Minor and Roman Britain, but not yet for the Sasanian Empire.[136]

The information on Sasanian coins—although under-exploited—is one of the main sources of information about administration and politics of the late Sasanian Empire, because it usually provides precise historical data about who ruled where and when. The die-linked Khusrō II coins indicating the regnal years between 25 and 37 provide an additional feature to numismatic source criticism and methodology for the late Sasanian period. The reliability of plain numismatic information is no longer accepted to the same extent as it used to be. When Susan Tyler-Smith compiled her corpus of coins of Yazdgard III, she was not aware of the extent of Khusrō II coins struck under Yazdgard III (except some of the pseudo-Sasanian ones, which are clearly set apart by their style). Only numismatic methodology—meaning a comprehensive die comparison—can establish that these coins come from the period of Yazdgard III rather than of Khusrō II.

[134] Excluded from the discussion here is the possibility that we are dealing merely with the production of random "private" workshops. The coins are in many ways deeply rooted in the tradition of the official mints, with respect to style, die axis, and weight.

[135] Susan Tyler-Smith in her forthcoming book about the Shīrāz hoard.

[136] For Roman Britain see Sellwood 1988: 288–91. This is a bit different to the system of die sharing in Asia Minor, where certain workshops produce the civic coinage for a number of cities, see also Kraft 1972, and subsequently Johnston 1974, 1982–3.

Fig. 10. Obverse dies.

Fig. 11. Obverse dies and reverse dies (chains 1–4).

Fig. 12. Reverse dies (chain 5) and additional coins.

Fig. 13. Additional coins and Yazdgard III coins

Fig. 14. Yazdgard III coins.

XII. CATALOGUE

XII.1. Introduction

The inclusion of coins within this catalogue faces the challenges of any unprovenanced hoard divided into commercial parcels and diluted with similar material. On the one hand, the cataloguer wants to give as much context as possible, on the other hand he wants to stay as focused as possible, emphasising his argument. All dies of Berlin parcel II were photographed. Die duplicates with the same combination were in general not individually registered; exceptions were made for images of continuing material fatigue. The photographed and documented coin got a photo number which is cited throughout the text for the individual coin. Not all technical data of all coins could be taken, such as weight and die axis due to time restrictions. The idea of a consecutive numbering for citation of the coins was dismissed because this would imply a completeness of a group of coins, which does not exist.

The core of the study was the inventory of all coins of the Berlin II parcel (*c.* 1200 coins). Like the largely unrecorded Berlin I parcel, Berlin II seemed to represent the original hoard best. Berlin II includes not only coins from the die chains, but coins stylistically similar but which cannot (yet) be linked, and others which are clearly unrelated to the chains but were part of the hoard and finally coins clearly unrelated to the hoard under study. Because the original hoard cannot be reconstructed sufficiently, and a list of the inventory of the Berlin II parcel is only of interest to specialists, it was decided to make the inventory of Berlin II parcel available on academia.edu for future research.

The following catalogue is thus divided into three parts: the die-linked coins (12.2), the coins referred to in the text (12.3), and the *dipinti*.

The numbers refer to photographed individual coins of the parcels. The first digit of the four-digit number indicates the parcel. Other provenances are cited in detail.

0xxx Berlin II parcel (*c.* 1200 coins, Oct. 2011)
1xxx private collection (1 coin, July 1996, not part of the recent hoard)
30xx Berlin III parcel (24 related coins, May 2012)
40xx Berlin IV parcel (8 related coins, Dec. 2012)
50xx Berlin V parcel (31 related coins, Feb. 2013)
60xx Berlin VI parcel (43 coins of Yazdgard III, Sept. 2013)
7 and 8xxx Berlin I parcel (*c*. 800 coins, Summer 2009).

The catalogue is organised by mint abbreviation, date, and die combination. Where there was more than one coin for one die combination, the quantity and provenances are given as well. Only coins photographed or already published are listed as individuals with a photo number, and usually with their technical data.

XII.2. Die combinations within the chains

Total		
25 obverses	409 coins	24 reverses
Die chain 1		
9 obverses	265 coins	6 reverses
Obv11		
ART25C	1	ART25a
Obv12		
ART25A	1	ART25a
Obv13		
ART25B	100	ART25a
ART37D	5	ART37a
GD37A	22	GD37a

The material fatigue of the obverse die GD37A=ART25B includes both early, middle, and later stages, implying that they were used at the same time within the same workshop.

Obv14		
GD37B	20	GD37a
Obv15		
ART26A	8	ART26a
	11	ART26b
ART37A	23	ART37a
Obv16		
ART26B	9	ART26a
ART37B	29	ART37a
BYSh26B	3	BYSh26a
Obv17		
ART26C	7	ART26a
ART37C	3	ART37a
BYSh26A	12	BYSh26a
Obv18		
ART37H	6	ART37a
Obv19		
ART37O	5	ART37a
Die chain 2		
5 obverse	33 coins	6 reverse
Obv21		
AW31C	2	AW31c
AW35C	3	AW35a

ART33E	1	ART33a
WYHC?30C	1	WYHC?30c
Obv22		
ART33A	3	ART33a
Obv23		
ART33B	2	ART33a
AY30A	5	AY30a
NY30A	2	NY30a
Obv24		
AW35A	8	AW35a
Obv25		
AW35B	6	AW35a

Die chain 3

Stylistically ShY37a and AY37a and AY37i are so close that they are from the same hand. On die ShY37C=AY37B, APD was erased.

6 obverses	88 coins	6 reverses
Obv31		
AY37A	1	AY37a
	1	AY37i
LD37A	1	LD37a
NY30D	2	NY3(0?)d
WYHC35B	3	WYHC35a
Obv32		
AY37B	6	AY37a
ShY37C	13	ShY37a
Obv33		
ShY37A	26	ShY37a
Obv34		
ShY37B	28	ShY37a
Obv35		
ShY37D	4	ShY37a
Obv36		
WYHC35A	3	WYHC35a

Die chain 4

1 obverse die	5	2 reverse dies
Obv41		
ART37I	2	ART37e
WYHC28B	3	WYHC28b

Die chain 5

4 obverses	18 coins	4 reverses
Obv51		
ART37G	4	ART37b
	3	ART37c
Obv52		
ART37F	3	ART37c
	1	ART37d
Obv53		
ART37L	1	ART37c
Obv54		
ART37E	5	ART37d
	1	ART37m

XII.3. Catalogue of die-linked coins

A list of the entire Belin II parcel can be found here: https://uni-hamburg.academia.edu/StefanHeidemann

ART 25

A-a; **Obv. die no. 12= ART 25A**

0057 (4.10 g; 3 h; obv. and rev. ill.; metal analysis)

B-a; **Obv. die no. 13= ART25B= GD37A= ART 37D**

100 coins. Private coll.= 1; Berlin I= 6; Berlin II= 81; Berlin III= 3; Berlin V= 3; London= 2; Moscow= 4 coins. This is the most common die combination in the Berlin II parcel.

Documented: 1351 (4.03 g; 9 h; early stage; priv. coll. acquired July 1996); 0058 (4.14 g; 3 h; obv. ill. early stage 1); 0059 (4.15 g; 9 h; early stage 1); 5001 (4.61 g; 9 h; early stage 1); 0060 (3.91 g; 3 h; early stage 2); 7735 (4.10 g; 9 h; early stage 2; 0061 (4.10 g; 10 h; obv. ill.; middle stage); 3002 (4.17 g; middle stage); 0062 (4.10 g; later stage, metal analysis); 7736 (4.14 g; 6 h; later stage); 7737 (4.12 g; 6 h; later stage; rev. dipinto [no. 8]); 7738 (4.12 g; 6 h; later stage; rev. dipinto [no. 9]); 7739 (4.17 g; 9 h; obv. ill.; later stage; rev. dipinto [no. 10]); 7740 (4.14 g; 2 h; later stage; rev. dipinto [no. 11]); 5002 (3 h; later stage); 5003 (4.12 g; 3 h; later stage); Zeno 82566 (4.12 g); Zeno 82567 (4.14 g); Zeno 82770 (4.02 g); Zeno 82571 (4.03 g); London parcel, 2 coins in early stage.

C-a; **Obv. die no. 11 = ART25C**

0063 (4.10 g; 9 h; obv. ill.; metal analysis).

ART 26

A-a. **Obv. die15 = ART26A = ART37A**

8 coins. Berlin II= 5; Berlin IV= 1; London= 2 coins.

Documented: 0066 (4.12 g; 3 h; rev. ill.; very early stage, hammered edge); 4001 (4.17 g; 3 h; early stage, hammered edge); London parcel, 2 coins.

A-b. **Obv. die 15 = ART26A = ART37A**

11 coins. Berlin I = 1; Berlin II = 7; Berlin V = 1; Moscow = 2 coins.

Documented: 0067 (4.16 g; 3 h; obv. and rev. ill.; metal analysis); 5004 (4.14 g; 9 h); 8646 (4.16 g; 3 h); Zeno 82552 (4.11 g); Zeno 82570 (4.21 g).

B-a. **Obv. die 16 = ART26B = ART37B = BYSh26B**
9 coins. Berlin II = 9 coins.
Documented: 0068 (4.13 g; 6 h; obv. ill.; obverse hatching from flan preparation; metal analysis)

C-a. **Obv. die 17 = ART 26C = ART 37 C = BYSh 26A**
7 coins. Berlin II = 3; Berlin III = 4 coins.
Documented: 0069 (4.11 g; 9 h; obv. ill.); 3003 (4.13 g); 3004 (4.13 g); 3005 (4.13 g; 8 h).

ART 33

A-a. **Obv. die 22 = ART33A**; a year as SCSH
3 coins. Berlin II = 3 coins
Documented: 0075 (4.11 g; 3 h; rev. ill.; metal analysis).

B-a. **Obv. die 23 = ART33B = NY30A =AY30A**
2 coins. Berlin parcel II = 2 coins.
Documented: 0076 (4.18 g; 3 h; obv. ill.; metal analysis).

E-a. **Obv. die 21 = ART33E =AW31C =AW35C**
7733 (4.06 g; 3 h; obverse scaled off, reverse die ART33a is at a later stage).

ART 37

A-a. **Obv. die 15 = ART37A = ART26A**
23 coins. Berlin II = 19; Berlin IV = 1; Berlin V = 3 coins.
Documented: 0082 (4.11 g; 3 h; rev. ill.; metal analysis); 4003 (4.08 g; 3 h); 5006 (4.08 g; 9 h; later stage); 5007 (4.11 g; 2.30 h); 5008 (2.45 h).

B-a. **Obv. die 16 = ART 37B = ART26B = BYSh26B**
29 coins. Berlin II = 28; Berlin V = 1 coin.
Documented: 0083 (4.14 g; 3 h; obv. ill.; metal analysis); 5009 (4.11 g; 9 h).

C-a. **Obv. die 17 =ART37C =ART26C = BYSh 26A**
3 coins. Berlin II = 2; Berlin III = 1 coin
Documented: 0084 (4.14 g; 9 h; obv. ill.; early stage); 3009 (4.17 g; later stage).

D-a. **Obv. die 13 = ART 37D = ART 25B = GD 37A**
5 coins. Berlin II = 3; Berlin V = 1 Moscow = 1 coin.
Documented: 0085 (4.12 g; 3 h; obv. ill.); 5005 (4.12 g; 9 h); Zeno 82568 (4.14 g).

H-a. **Obv. die 18 = ART37H**
6 coins. Berlin I = 1; Berlin II = 2; Berlin III =1; Moscow = 2 coin.
Documented: 7742 (4.16 g; 3 h; dipinto); 0086 (4.05 g; 3 h; obv. ill.; metal analysis); 3010 (3.98 g; 3 h; metal analysis); Zeno 82572 (4.07 g); Zeno 82573 (4.10 g).

O-a. **Obv. die 19 = ART37O**
5 coins. Berlin V = 2; London = 1; Moscow = 2 coins.
Documented: 5010 (4.06 g; 8.30 h; obv. ill.; hammered edge); 5011 (4.08 g; 3 h); London parcel (scaled off obverse die); Zeno 82553 (4.16 g; scaled off obverse die); Zeno 82549 (3.95 g; scaled off obverse die).

I-e. **Obv. die 41 = ART37I = WYHC28B**
2 coins. Berlin II = 1; Berlin IV = 1 coin.
Documented: 0093 (4.07 g; 3 h; obv. ill.; metal analysis); 4002 (3.67 g; 3 h; rev. ill.).

G-b. **Obv. die 51 = ART37G**
4 coins. Berlin II = 2; Berlin III = 1; Noble = 1 coin.
Documented: 0087 (4.18 g; 9 h obv. and rev ill.); 0088 (4.19 g; earlier stage; metal analysis); 3014 (4.07 g; 2 h); Noble Numismatics 2012: no. 3465.

G-c. **Obv. die 51 = ART37G**.
3 coins. Berlin II = 1; Berlin III = 1; Moscow = 1 coin.
Documented: 0089 (4.20 g; 3 h; obv. and rev. ill.; later stage); 3011 (4.20 g; metal analysis); Zeno 82550 (4.03 g).

F-c. **Obv. die 52 = ART37F,** puffy letters
3 coins. Berlin II = 1; Berlin III = 1; Berlin IV = 1 coin.
Documented: 0090 (4.02 g; 3 h; obv. ill.; metal analysis); 3012 (4.04 g; metal analysis); 4004 (4.08 g; 9 h).

F-d. **Obv. die 52 = ART37F**
Documented: Zeno 82548 (4.03 g).

L-c. **Obv. die 53 = ART37L**
Documented: 0091 (4.05 g; 3 h; obv. ill.; metal analysis).

E-d. **Obv. die 54 = ART37E**
5 coins. Berlin II = 2; Berlin III = 3 coins.
Documented: 0092 (3.88 g; 3 h; obv. and rev. ill.; metal analysis); 3013 (4.01 g; 3 h; metal analysis).

E-m. **Obv. die 54 = ART37E**
Documented: 0094 (3.70 g; 3 h; obv. and rev. ill.; metal analysis).

AW 31

C-c. **Obv. die 21 = AW31C = AW35C = ART33E**
2 coins. Berlin I = 2 coins.
Documented: 7744 (4.16 g; 3 h); 7745 (4.04 g; 4 h; rev. ill.; reverse dipinto [no. 12]).

AW 35

A-a. **Obv. die no. 24 =AW35A**
8 coins. Berlin II = 6; Berlin V = 1; London = 1 coin.
Documented: 0126 (4.04 g; 9 h; obv. ill.; metal analysis); 5013 (4.07 g; 9 h); London parcel.

B-a. **Obv. die no. 25 =AW35B**
6 coins. Berlin II = 4; Moscow = 2 coins.
Documented: 0127 (4.08 g; 10 h; obv. ill.; metal analysis); Zeno 82782 (4.00 g); Zeno 82785 (4.16 g).

C-a. **Obv. die no. 21 =AW35C =AW31 C =ART33 E**
3 coins. Berlin I = 1; Berlin II = 1; Moscow = 1 coin.
Documented: 0128 (4.10 g; 8.30 h; metal analysis); 7746 (4.10 g; 3 h; obv. and rev. ill.); Zeno 82574 (4.19 g).

AY 30

A-a. **Obv. die 23 = NY30A = AY30A = ART33B**
5 coins. Berlin II = 2 coins; Moscow = 3 coins

Documented: 0135 (4.09 g; 10 h; obv. and rev. ill.; metal analysis); Zeno 82565 (4.20 g); Zeno 82748 (4.25 g); Zeno 82741 (4.14 g).

AY 37

A-a. **Obv. die 31 = AY37A = LD37A = NY3(0?)D = WYHC35B**
Documented: 0153 (4.16 g; 8.30 h; obverse severe scaling off).

A-i. **Obv. die 31 = AY37A = LD37A = NY3(0?)D = WYHC35B**
Album 2012a: no. 18 (obv. die 31 in an earlier stage; rev. ill.).

B-a. **Obv. die 32 = AY37B = ShY37C, Erasure of APD on Obv. die 32**
6 coin. Berlin II = 5; London = 1 coin.
Documented: 0154 (4.14 g; 3.30 h; rev. ill.); London parcel.

BYSh 26

A-a. **Obv. die no. 17 = BYSh26A = ART 26C = ART 37C**
12 coins. Berlin I = 1; Berlin II = 7; Berlin IV = 3; London = 1 coin.
Documented: 0229 (4.08 g; rev. ill.; 9 h; early stage); 4005 (4.15 g; 3 h; middle stage; rev. faint traces of a dipinto); 4007 (4.18 g; 2.30 h; middle stage); 7747 (4.14 g; 3 h; middle stage); 4006 (4.18 g; 3 h; later stage); 0230 (4.10 g; 9 h; rev. ill.; later stage; metal analysis); London parcel.

B-a. **Obv. die no. 16 = BYSh 26B = ART 26B = ART 37B.**
3 coins. Berlin II = 3 coins.
Documented: 0231 (4.08 g; 2.30 h); 0232 (4.16 g; 3 h; obv. ill.; dipinto [no. 7]).

GD 37

This mint abbreviation is not clearly legible. A die crack at the mint abbreviation blurs the reading. Later stages could also be read as YZ 37. Early strikes of this dies show an almost clear GD.

A-a. **Obv. 13 = GD37A = ART25B = ART37D** (all stages of the deterioration of A included)
22 coins. Berlin II = 22 coins.
Documented: 0612 (4.16 g; 3 h; rev. ill.; early stage); 0613 (4.08 g; 8.30 h; middle stage, hammered edge); 0614 (4.14 g; 4 h; obv. ill.; later stage).

B-a. **Obv. die 14 = GD37B**
20 coins. Berlin II = 19; Berlin V = 1 coin.
Documented: 0615; (4.10 g; 9 h; obv. ill.); 5031 (3.99 g; 9 h).

LD 37

A-a. **Obv. die 31 = AY37A = LD37A = NY3(0?)D = WYHC35B**
Documented: 0350 (4.14 g; 9 h; rev. ill.; hammered edge).

NY 30

A-a. **Obv. die 23 = NY30A = AY30A = ART33B**
2 coin. Berlin I = 1; Berlin II = 1 coin
Documented: 0427 (4.17 g; 3 h; obv. and rev. ill.); 8645 (4.09 g; 9 h).

D-d. **Obv. die 31 = AY37A = LD37A = NY30D = WYHC35B**
2 coins. Berlin II = 1; Berlin V = 1 coin.
Documented: 0438 (4.09 g; 9.30 h; obv. ill.); 5019 (4.10 g; 3 h; rev. ill.).

ShY 37

A-a. **Obv. die 33 = ShY37A**
26 coins. Berlin II = 23; Berlin III = 1; Berlin V = 2 coins.
Documented: 0482 (4.04 g; 3 h; obv. and rev. ill.; hammered edge; obv. early stage); 0483 (4.07 g; 3 h; obv. ill.; hammered edge; later stage; metal analysis); 5021 (4.12 g; 9 h; slightly hammered edge; later stage); 5022 (4.03 g; 9 h; hammered edge; later stage).

B-a. **Obv. die 34 = ShY37B**
28 coins. Berlin I = 1; Berlin II = 20; Berlin III = 2; Berlin V = 5 coins.
Documented: 0484 (4.20 g; 3 h; obv. ill.; early stage); 0485 (4.07 g; 3 h; obv. ill.; later stage; metal analysis); 8643 (4.16 g; 3 h); 5023 (4.12 g; 3 h); 5024 (4.16 g; 9.30 h); 5025 (3 h); 5026 (4.17 g; 3 h); 5027 (4.08 g; 3 h).

C-a. **Obv. die 32 = ShY37C = AY37B;** Erasure of APD on obv. die 32
13 coins. Berlin II = 12; Berlin V = 1 coin.
Documented: 0486 (4.22 g; 9 h; obv. ill.; metal analysis); 5020 (4.12 g; 9 h).

D-a. **Obv. die 35 = ShY37D**
4 coins. Berlin II = 2; Berlin III = 1; Berlin V = 1 coin.
Documented: 0487 (4.26 g; 9 h; obv. ill.); 3071 (4.04 g; metal analysis); 5028 (4.11 g; 3 h).

WYHC 28

B-b. **Obv. die 41 = ART37I = WYHC28B**.
3 coins. Berlin II = 1; Berlin III = 2
Documented: 0541 (4.03 g; 3 h; rev. ill.; hammered edge).

WYHC?30

C-c. **Obv. die 21 = WYHC30C = ART33E = AW31C = AW35C**
May be read also as WYH.
8901 (4.11 g; 3 h; obv. and rev. ill.).

WYHC 35

A-a. **Obv. die 36 = WYHC35A**
3 coins. Berlin II = 3 coins.
Documented: 0568 (4.14 g; 3 h; obv. and rev. ill.; obverse hatching on the margins from flan preparation; metal analysis).

B-a (**Obv. die 31 = AY37A = LD37A = NY3(0?)D = WYHC35B**
3 coins. Berlin I = 1; Berlin II = 1; Berlin III = 1 coin.

Documented: 3079 (4.15 g; early stage; hammered edge; metal analysis); 8644 (4.14 g; 9 h; middle stage); 0569 (4.12 g; 9 h; obv. ill.; later stage).

XII.4. Catalogue of additional material

AHM 31

A-a: 0017 (3.61 g; 9 h; obv. and rev. ill.; dipinto [no. 1] obverse).

AM 17

The reverse die AM17a shares an APD and a none-APD obverse.

A-a APD: 0048 (4.12 g; 3 h; obv. and rev. ill.). B-a: 0049 (4.16 g; 2.30 h; obv. and rev. ill.).

AW 27

A-a: 0114 (4.19 g; 9 h; obv. and rev. ill.; dipinto [no. 2]; part of the hoard, typical green corrosion).

AY 14

A-a: 0130 (4.12 g; 9.30 h; obv. and rev. ill.; additional line under A of AY and dipinto [no. 3]).

AY 31

C-c, or regnal year 33: 0141 (4.08 g; 9 h; obv. and rev. ill.; dipinto [no. 4] on reverse, grayish surface).

AY 37

C-b: 0155 (3.86 g; 9 h; obv. and rev. ill.; reverse traces of dipinto [no. 5] under greenish corrosion).

BN 26

A-a: 0210 (4.12 g; 2.30 h; obv. and rev. ill.; rev. traces of dipinto [no.6], greenish corrosion; metal analysis).

DA 32

The reverse die DA32a shares an APD and a non-APD obverse. The die engraving of the obverses DA32A and DA32B are slightly blundered. This suggests an inclusion in the original hoard and a production at the time of Yazdgard, although a die link to the chains could not be established yet. A-a: 0252 (4.08 g; 3 h; obv. and rev. ill.; later state of reverse die). B-a **APD**: 0253 (4.15 g; 3 h; earlier state of reverse die).

GD 32

C-c APD erased on obverse die: 7754 (3.75 g; 3 h; obv. and rev. ill.; worn, rounded edge).

XII.5. Catalogue of Yazdgard coins within the parcels

All Yazdgard coins from all parcels were photographed and documented.

Obverse: portrait of Yazdgard III to the right, bearded double necklace with ring and three pearls, crenalations/merlons appear as three thick lines. Reverse: pellet at 11.55 left of star/crescent. STS (2000), generally obverse type 6 and 10, and reverse type 3, nos. 34–35.[137] Obverse type 6 is always assumed, type 10 is always indicated in the description. The difference is the rendering of the R/L in the name. There is no typological difference between them, because both types are die-linked (nos. 6006, and 0221). The reverse die of STS no. 33 does not show the typical pellet at 11.55, which later became a hallmark of this Kirmān series.

BN 12

A (STS 6)-a: 3 coins: 6001 (4.15 g; 3 h; ill.); 6002 (4.14 g; 3.30 h; metal analysis); Album 2014a: no. 71 (4.10 g). B-b: 6003 (4.22 g; 3.30 h; coll. Robert Schaaf). B-c: 6004 (4.06 g; 3 h; ill.). C (STS10)-d: 6005 (4.21 g; 3 h). D-e: 6006 (4.09 g; 3.30 h). E (STS 10)-e, same dies as Tyler-Smith (2000), no. 35, plate 16 (type 10/3): 0221 (4.14 g; 3 h; ill.; early stage of the reverse die). F-f, die **BN12F = GLM13A (no. 6044):** 0220 (4.16 g; 9 h; ill.).

BN *12

A-a. 6 coins: During the course of its use die BN*12A was deteriorating; the use of the reverse die is random in sequence. At the beginning of the sequence is 6007 (A-a) and the end 6009 (A-a).The exact position of the coins in between is difficult to determine: 6007 (4.10 g; 9 h); 6008 (4.19 g; 9 h); 6009 (4.34 g; 9 h; ill.; traces of dipinto); 6010 (4.12 g; 10 h; metal analysis); 6011 (4.24 g; 9 h); Album 2012b: no. 55. A-b. 3 coins: 6012 (4.19 g; 9 h; ill.; metal analysis); 6013 (4.00 g; 9 h); 6014 (4.10 g; 9 h). A-c: 6015 (4.14 g; 3 h). C-d: 6045 (4.25 g; 9 h). C-e: 6016 (4.02 g; 3 h; ill.). C-f: 6017 (4.18 g; 9 h). D-g: 6018 (4.14 g; 3 h; ill.). D-h: 6019 (4.21 g; 2.30 h). E-i: 6020 (3.98 g; 3.30 h). F-j. 2 coins. Same obverse die BN*12F as Tyler-Smith (2000), no. 51a (coll. U. Tübingen 1993–17–41, earlier state of the die): 6021 (4.26 g; 3 h; reverse traces of a dipinto); Persian Gallery. F-p. 3 coins: Tyler-Smith (2000), no. 51a (coll. U. Tübingen 1993–17–41); 6029 (4.12 g; 9 h; Album 2014b: no. 78); 6030 (4.02 g; 3 h; metal analysis). F-r: 6032 (4.16 g; 12 h. Album 2014b: no. 79). G-k, reverse die k is without a pellet at 11.55 h. 2 coins: 6022 (3.91 g; 9 h; ill.); 6023 (4.09 g; 2.30 h; later stage). H-l: 6024 (4.18 g; 2.30 h). H-m: 6025 (4.08 g; 3 h; ill.). I-n. 2 coins. 6026 (4.16 g; 9.30 h); 6027 (4.14 g; 9.30). I-o: 6028 (4.14 g; 9.30 h). J-q: 6031 (4.12 g; 9 h). K-m: 6033 (4.08 g; 3 h).

[137] Tyler-Smith attributes nos. 33–34 to type 5/3, and no. 35 to type 10/3. They can all be attributed to type 10/3.

L-j **Obv. BN*12L = BN14A**: 6034 (4.14 g; 3 h; ill.). M-s. 2coins: 6036 (4.18 g; 9 h); 6037 (4.02 g; 8.30 h). N-u: 6038 (4.14 g; 3.30 h).

O-n: Coll. Robert Schaaf (not related to the hoard): P-t: Coll. Tyler-Smith, no. 1257.

BN 14

A-a **Obv. A =BN*12 L**: 6035 (4.13 g; 9 h; ill.). B-b: 6039 (4.06 g; 9 h): B-c: 6040 (4.13 g; 6 h; coll. Robert Schaaf): C-d: 6041 (4.04 g; 3.30 h; ill.).

GLM 13

STS type 6/3, rev. pellet at 11.50

A-a, **Obv. A = BN12A:** 6044 (4.12 g; 3 h; ill.).

NAL 13

Type STS type 5/3, compare Tyler Smith (2000), no. 36 (type 7/3)

A-a: 6042 (4.02 g; 2 h; ill.).

ST 10

Type STS 10/3, no. 129, same dies.

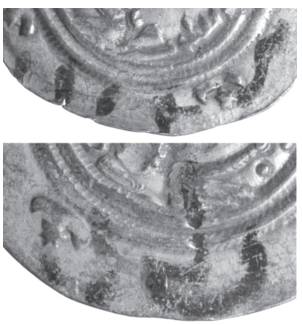
A-a: 6043 (4.10 g; 2 h; ill.; sand and light green turquoise verdigris makes the coin part of the hoard).

XII.6. Catalogue of dipinti (Dieter Weber)

XII.6.1. Overview

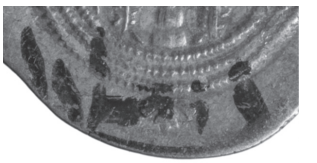
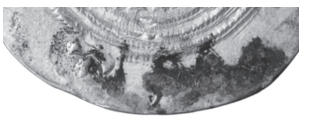
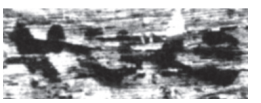
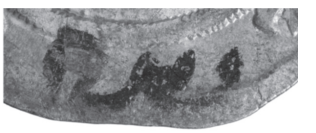
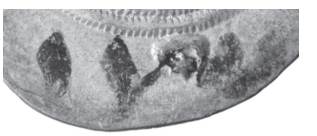
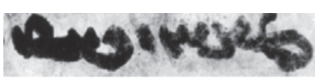
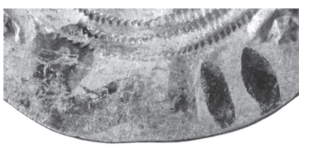
The catalogue is divided in three parts. The first includes almost all legible *dipinti* from Berlin I, and II parcel. The second part (XII.6.3) includes *dipinti* from the hoard from the time of the "Collapse of the Sasanian Empire (AD 638–39)" (Heidemann 2013). The third part (XII.6.4) collects random coins from the late period with *dipinti*.

XII.6.2. Dipinti on coins of Berlin parcels I and II

No.	*Object*	*Commentary*	*Dipinto*
1	 0017_obv	The text consists of two words, [a] ⟨ʾsṭʾnk′⟩ or rather ⟨ʾsṭwk′⟩ representing the place name *Astōg* attested at least three times in letters from the time of Hormizd V (AD 630–632),[1] and [b] ⟨glwkʾn⟩ *grawagān* "pledge, security" (CPD) thus giving the meaning "pledge of (the village of) *Astōg*".	
2	 0114_rev	current cursive Pahlavi ⟨kwʾṭ′⟩ *Kawād* p.n.	
3	 0130_rev	Pahlavi ⟨bwlʾndwhṭ′⟩ *Bōrānduxt* p.n. ? Possibly an allusion to queen *Bōrān(duxt)* (r. AD 630–631)[2]	

[1] Cf. Weber (2010). The place name has not yet been identified but it must be assumed to be located western part of Iran because Hormizd V reigned only over parts of the Sasanian empire, particularly over parts of Iraq and the adjacent regions of the Iranian plateau; it may well be located in Khuzestan. That this name is so well attested leads to the assumption that Astōg must have had a specific function under Hormizd V; in fact, in the document **Berk. 242** (unpublished) this village is connected with "the worship of *drōn*" (a certain Zoroastrian rite) ordered by exactly that king.

[2] Cf. Panaino 2006.

4	 0141_rev	possibly Pahlavi ⟨knʾlk′⟩ *kanārag* “edge, limit, boundary” (CPD) ?	
5	 0155_rev	incomprehensible	
6	 0210_rev	incomprehensible	
7	 0232_obv	current cursive Pahlavi ⟨dʾšn⟩ *dāšn* “gift”, cf.  **P. 44**, 11[3]  **P.Pehl. 119**, 2[4]	
8	 7737_rev	current cursive Pahlavi ⟨whʾk′⟩ *wahāg* “trading; value” (CPD), cf. **P. 156** V 4;[5]  **Berk. 89**, 6[6] (year 48 = AD 699/700) 	
9	 7738_rev	current cursive Pahlavi ⟨wndʾṭ′⟩ *windādan, wind-* “find, obtain, acquire” (CPD); cf. ⟨mʾhwndʾṭ′⟩ *Māhwindād* p.n. **P. 156** R 7[7] 	

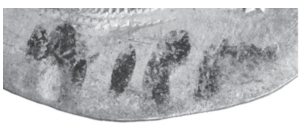
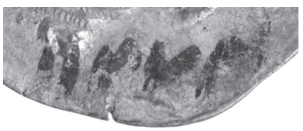
[3] See Weber 2009.

[4] Unpublished fragment from Egypt (AD 619–29) from the Vienna collection of Pahlavi papyri; on this collection see Weber 2007a.

[5] See Weber 2003: 43.

[6] Unpublished document from the “Pahlavi Archive”.

[7] See Weber 2003: 42.

10	 7739_rev	Certainly not Pahlavi ⟨kylwk⟩ *kirrōg* “artisan, craftsman; skilled” (CPD), but rather <kdhlwk> or the like. Currently no further interpretation possible.	
11	 7740_rev	Current cursive Pahlavi ⟨sncwk′⟩ *sanǰōg* “small weight or measure”; cf. *saxtan, sanǰ-* “weigh” (CPD), NP سنج *sanǰ* “weight; measure” [Steingass]	
12	 7745_rev	Pahlavi ⟨dynʾpzwn′⟩ *dēn-abzōn* lit. “increase of the (Good) Religion”; cf. ⟨dynʾpzwṭ′⟩ p.n. **Berlin 10**, 4[8] (no year given) 	

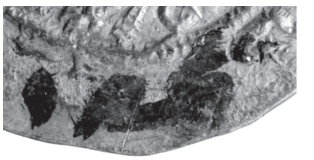
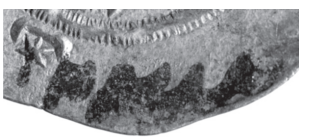
XII.6.3. Dipinti on coins of a late Sasanian hoard (closing coin AD 638–39)

All coins are struck under Ardashīr III. Details on the coins are found in Heidemann (2013). The first number is the catalogue number of the article; the second refers to the *dipinti* catalogue here.

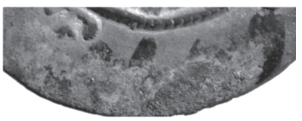
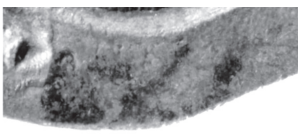
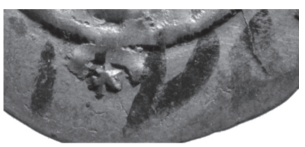
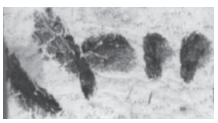
AT 1: no. 08; dipinto [no. 13]. **AY 2:** no. 16; dipinto [no. 14]: no. 17; 3.23 g; 3 h; dipinto [no. 15]. no. 18; dipinto [no. 16]. **AYL 2:** no. 20; dipinto [no. 17]; no. 21; dipinto [no. 18]. **AYLAN 2:** no. 25; dipinto [no. 19]. **DA 2:** no. 34; dipinto [no. 20]; no. 35; dipinto [no.21]. **KL 2:** no. 38; dipinto [no. 22]. **ML 2:** no. 39; dipinto [no. 23]. **WH 2:** no. 48; dipinto [no. 24]; no. 50; dipinto [no. 25]. **YZ 2:** no. 61; dipinto [no. 26]; no. 62; dipinto [no. 27]; no. 63; dipinto [no. 28].

13	 08_rev	only traces possibly to be read Pahlavi ⟨mz̲dkʾn⟩, patronymic *Mazdagān* ?	
14	 16_rev	Pahlavi ⟨k-…-ṭ′⟩ ?	

[8] See Weber 2008: 49–51; corrections in Gignoux 2010.

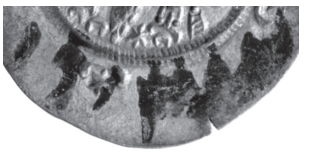
15	 17_rev	Pahlavi ⟨ʾp̄lmṭ′⟩ is a tentative reading, possibly *abar-mad*, cf. Pahlavi *abar madan* "to cope (with), comprehend" (CPD).[9] The beginning of the word is unfortunately somewhat blurred.	
16	 18_obv	traces, incomprehensible	
17	 20_rev	Pahlavi ⟨…-ṭ′⟩ ?	
18	 21_rev	Pahlavi ⟨LBMHynk′⟩ *dilēnag* "heart; darling" ?	
19	 25_rev	Pahlavi ⟨mʾhykyl⟩ *māhīg-gīr* "fisherman" if from *⟨mʾhyk + gyl⟩ "catching fish" (cf. *griftan*, prs. *gīr-* "take, hold, restrain" [CPD])	
20	 34_rev	incomprehensible	

[9] CPD = D.N. MacKenzie (1971).

21	 35_rev	traces, illegible because of corrosion on the margin, at any rate, the word must begin with ⟨k-…⟩	
22	 38_rev	faint traces, possibly ⟨dʾšn⟩ *dāšn* “gift” as in no. 7	
23	 39_rev	Pahlavi ⟨dynwndʾṭʹ⟩ *Dēn-windād* p.n. ? Cf. the name *Māhwindād* mentioned *supra* no. 9.	
24	 48_rev	coarse writing, possibly ⟨cyl⟩ *čēr* “victorious, triumphant, brave” (CPD), but the final vertical stroke to the left is rather strange.	
25	 50_rev	illegible	
26	 61_rev	Pahlavi ⟨hwṭʾykʹ⟩ *x ʷadāyīg* “Sir”, cf. **P. 69**, 2[10]  **Berk. 34**, 6 (year 29 = 680/1 CE)[11] 	

[10] Weber 2007b: 187–88.

[11] Unpublished letter from the “Pahlavi Archive”.

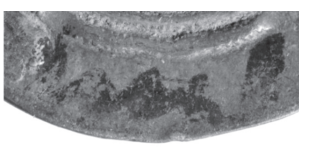
27	 62_rev	Possibly Pahlavi ⟨hwsṭwk′⟩ *xʷastūg* “confessing, believing” (CPD)	
28	 63_rev	incomprehensible	

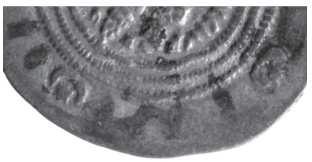
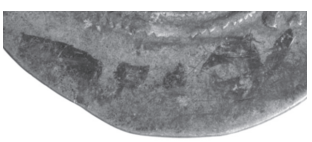
XII.6.4. Dipinti on random samples of late Sasanian coins

These images were collected over an extended time.

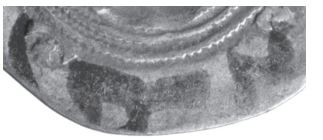
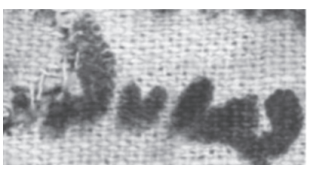
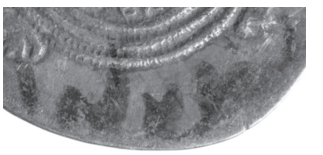
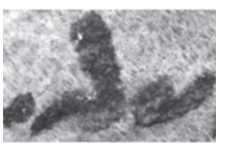
Khusrō I: SB 8279 (WYHC 28; 3.95 g; 3 h; dipinto [no. 29]).

Khusrō II: SB 8734 (ART 6; 3.44 g; 3 h; dipinto [no. 30]); SB 8752 (ART 26; 4.03 g; 3 h; dipinto [no. 31]); SB 8761 (ART 29 APD; 4.01 g; 2 h; dipinto [no. 32]); SB 8887 (BN 27; 3.98 g; 3 h; dipinto [no. 33]); SB 8889 (BBA 25; 3.26 g; 3 h; dipinto [no. 34]); SB 8892 (GD 2/3?; 3.94 g; 3 h; dipinto [no. 35]); SB 8893 (GD 31; 4.02 g; 9 h; dipinto [no. 36]); SB 8894 (GD 33; 4.05 g; 3 h; dipinto [no. 37]); SB 8895 (GD 35; 3.65 g; 3 h; dipinto [no. 38]); SB 8896 (NAL? 6; 4.09 g; 4 h; dipinto [no. 39]); SB 8898 (ST 35; 3.54 g; 3 h; dipinto [no. 40]); SB 8899 (WYH 12; transitional type; 3.06 g; 3 h; dipinto [no. 41]); SB 8900 (WYHC 32; 4.10 g; 3 h; dipinto [no. 42].

29	 SB 8279_rev	current cursive Pahlavi ⟨swlʾk′⟩ *surāg* “hole, burrow” (CPD)	
30	 SB 8734_rev	possibly current cursive Pahlavi ⟨lsyk(′)⟩ *rahīg* “child, page” (CPD)	
31	 SB 8752_rev	Sogdian according to N. Sims-Williams, Cambridge. See fn 73, above.	

32	 SB 8761_rev	current cursive Pahlavi ⟨wlyck′⟩, cf. *wirēxtan*, *wirēz-* “flee, escape” (CPD)	
33	 SB 8887_rev	incomprehensible	
34	 SB 8889_obv	current cursive Pahlavi ⟨wndʾṭʾwhrmz̲d …⟩ p.n.[12] but the separate characters to the extreme left cannot be interpreted.	
35	 SB 8892_rev	incomprehensible	
36	 SB 8893_rev	⟨…-whwmn-š⟩ ?	
37	 SB 8894_rev	“classical” Pahlavi writing, possibly ⟨pṭʾdyh⟩ = *pattāyīh* “endurance” ?	

[12] Cf. Gignoux 1986: no. 1001.

38	 SB 8895_rev	incomprehensible	
39	 SB 8896_rev	incomprehensible	
40	 SB 8898_rev	current cursive Pahlavi ⟨dʾṭplhw′⟩ p.n. *Dādfarrox,*[13] cf. **Berk. 20**, 15 (year 40 = 691/2 CE) 	
41	 SB 8899_rev	possibly current cursive Pahlavi ⟨plhw′⟩ = *farrox* “fortunate”, cf. **Berk. 96**, 1 (no year given) 	
42	 SB 8900_rev	incomprehensible	
43	Gignoux 1978, 141, no. 51	Book-Pahlavi (!) ⟨mz̲ds̲n′ plsp̄′ Y dyn⟩ *mazdēsn frasp ī dēn* “Mazda-worshipping [is] the beam of the (Good) Religion”	

[13] Cf. Gignoux 1986: no. 286.

Acknowledgements

We would like to thank all the colleagues with whom we discussed this evidence, especially Aleksandr Naymark, who invited the authors to give a presentation of this hoard at the Kochnev-Symposium at Hofstra University on 17 March 2012. In September 2012 another version was presented at the numismatic symposium in St Petersburg on the invitation of Konstantin Kravtsov. Katrin Gutberlet took thousands of photos in her spare time. Matthias Naue carefully arranged the layout of the plates. Susan Tyler-Smith had found her own research interest in the hoard. We gratefully acknowledge the constant fruitful exchange with her, challenging the authenticity of the hoard. This communication forced us to sharpen our argument, although we still have different opinions on the hoard. Last but not least we are most grateful to Melody Lawrence who undertook a careful revision of the English draft.

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