Abstract

In February 2015, divers off the coast of Caesarea spotted by chance a group of gold coins lying on the seabed. After alerting marine archaeologists of the Israel Antiquities Authority, a preliminary salvage excavation was conducted at the site and more than 2,600 Fatimid period gold dinars and fractions recovered, weighing a total of c. 7.5 kg. The coin's location and accompanying artifacts suggested that the coins originated from a shipwreck. The article gives a first insight into the hoard's content after two years of intensive identification work, presents some preliminary conclusions as for the reasons for its loss and offers some new insights into the circulation of Fatimid coinage in southern Bilad al-Sham.

Keywords

Caesarea Maritima harbour; Fatimid coinage; Fatimid coin hoards
INTRODUCTION

“I could discover no end or limit to their wealth, and I never saw such ease and comfort anywhere.”

Thus, wrote the Persian poet and traveler, Naser-e Khosraw, upon visiting Fatimid Cairo in AH 439/1047 CE.1 The importance of the gold dinar and its fractions is a by now well an established fact for historians and numismatists of the Fatimid era whose caliphs ruled for 260 years over large sways of North Africa, Egypt and the Eastern Mediterranean (909 – 1171 CE). The wealth and opulence of the Fatimid caliphs and the members of their court and administration was legendary, making Cairo one of the most important economic and cultural centers in the Islamic world.2 Above all, it are the thousands of contemporary documents dealing with financial and daily matters, discovered in the ancient Genizah (storeroom) of the Ben Ezra Synagogue in Old Cairo, that truly show the massive scale of the use of gold dinars during the tenth and twelfth centuries in Fatimid ruled territories and beyond.3 These documents are witnesses to the essential role the Fatimid dinar played in a highly monetized Fatimid society and its global trade network with Egypt at its center.4

In sharp contrast with the wealth of written documents about the use of gold money that have been made available and published, the coins themselves have until recently been relatively poorly studied. From the early twentieth century, catalogs of large numismatic collections mentioned the main types and a limited number of articles were published on selective types, denominations and their inscriptions.5 A number of important metallurgical studies were conducted on the gold content of these coins but this was done mainly for comparison with crusader period gold imitations.6 Only relatively recently in 2006, the first comprehensive reference work

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1 NASEER-E KHOSRAW: p. 55.
2 For the enormous affluence of Cairo and its inhabitants see NASER-E KHOSRAW: pp. 45–59; for the wealth and luxury of the Fatimid court see the listing of contents of the Fatimid palace treasuries looted in the civil war in 1068/69 in the KITAB AL-HADAYA WA AL-TUHAF: pp. 229 – 239. See also HALM 2003: pp. 404–414.
4 GOITEIN and FRIEDMAN 2007; GOLDBERG 2012.
6 See the various articles on this subject published by Andrew Ehrenkreutz between 1954 and 1964 in EHRENKREUTZ 1992; see also ODDY 1980.
on Fatimid coinage was published. But information about the actual circulation of coin types within and beyond the Fatimid territories has until now been virtually non-existent. This is particularly so for the Fatimid heartlands of Egypt and North-Africa where systematic registration and publication of site-finds from controlled excavations or provenanced discoveries is simply not available. Paradoxically, such information does come from territories on the periphery of the Fatimid empire, like Aghlabid Sicily, Umayyad ruled Spain and Fatimid Syria.

Large quantities of Fatimid coin finds—both single finds and hoards—come from southern Bilad al-Sham which during this period formed part of the eastern leg of the Fatimid empire, from Raqqa in Syria down to Aden in the Persian Gulf. Many of these were found in archaeological contexts in the area which today comprises the State of Israel. Among these are gold treasures, containing both coin and jewelry. Over the past hundred years some twenty-four hoards, dated between 970 and 1153, have been excavated. Many of the hoards contain only coins. But six are jewelry hoards and 11 hoards combine jewelry and coins. The majority of these come from excavations and finds in the major towns of Fatimid Bilad al-Sham: Asqalan/Ashkelon, Isdud/Ashdod, Arsuf/Apollonia, Qaysariyya/Caesarea, al-Quds/Jerusalem, Beisan/Beth-She’an, Tabariya/Tiberias. These cities and towns were islands of Fatimid influence in the politically unstable and fluid environment of Syria nominally under Fatimid rule since the 960s.

Excavations do show that money circulation in Fatimid Bilad al-Sham did not consist exclusively of gold, something not mentioned in written documents of the period. Coin finds demonstrate that despite the general dearth of silver in the Fatimid period, smaller silver currencies circulated in sufficient quantities serving as smaller denominations in daily transactions. During the second half of the tenth century these consisted of silver cuttings, small fragments of cut-up dirhams preserved in several small excavated hoards. By the eleventh century silver currency came in the form of small billon and copper-based dirham fractions that apparently circulated

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7 NICOL 2006.
8 For challenges facing archaeology of this period see the example of excavations and research of Early Islamic Fustat, in BACHARARCH 2000: pp. 1–11.
10 The IAA Provenanced Coin Data-base contains 3570 Fatimid period coins; circa 250 are single finds mostly from excavations; the rest 3,315 coins were found in hoards (see below).
11 A number of these have been published, some in a preliminary fashion in: KOOL forthcoming; ROSEN-AYALON 2008; LEVY and MITCHELL 1965/6; KOOL and Berman forthcoming; Berman 2004; BROSH 1998; WASSERSTEIN 1998.
13 KOOL, Berman, Shamir and TEPPER 2011; KOOL forthcoming.
in quite large numbers. Data from excavations shows that such billon and copper fractions circulated alike in cities, towns and rural settlements in southern Bilad al-Sham during the long reign of Mustansir billah (1036–1094).\textsuperscript{14} Apparently these served for the smaller day-to-day payments and show the intensive monetization and sophistication of the Fatimid economy. However, excavation finds clearly show that the majority of Fatimid period coin finds consist of gold dinars and fractions.—confirming that gold was indeed the fuel that fired the economic engine of the Fatimid state. The archaeological evidence thus \textit{grosso modo} confirms the picture drawn by the historians and the numismatists of this period.

\section*{THE HOARD}

In early February 2015 six scuba divers discovered gold coins lying on the seabed during a recreational dive in the ancient port of Caesarea. Realizing these were made of genuine gold they succeeded in retrieving some sixty coins before surfacing.\textsuperscript{15} Returning to the shore they alerted the Marine Archaeology Unit of the Israel Antiquities Authority (IAA) who shortly thereafter arrived at the port. An initial survey by IAA maritime archaeologists showed the coins were located some 300 meters from the shore, near the sunken remains of the ancient southern Herodian breakwater (Fig.1).

At a depth of circa seven-eight meters the archaeologists found a total of 2668 coins concentrated in a square measuring two meters by two meters. The coins were retrieved in five dives (February–August 2015), with most of the coins concentrated in the upper left section of the square.

The treasure is the largest gold hoard/assemblage ever to have been discovered in Israel’s coastal waters, possibly one of the largest ones found in the Eastern Mediterranean in living memory. It constitutes more than 7.5 kilos of gold.

Some of the coins were visible on the sea bed but the use of underwater metal detectors by the IAA divers indicated that the main body of the coins lay below the upper sea-bed level. To reach the coins the divers first had to remove an upper layer of fieldstones.\textsuperscript{16} Below, a second layer of coarse sand mixed with shells and pebbles.

\textsuperscript{14} The IAA coin database holds some 170 of these small billon fractions found in some 41 urban, semi-urban and rural settlements.

\textsuperscript{15} The group consisted of six divers: Zvika Fayer, Avivit Fischler, Yoav Lavi, Joel Miller, Shai Milner and Kobi Twina. Their speedy reporting of the find to the IAA was essential in preventing robbers from pillaging the site, recovering the large number of coins and documenting the site.

\textsuperscript{16} The site served as a dump for the fill from previous underwater excavations in other sections of the Caesarea harbor by the late Avner Raban in 1983. This explains the large number of fieldstones which had to be once more removed.
('zif-zif’) was taken out before reaching an underlayer of sand where the largest amount of the coins was found.

During the surveys IAA archaeologists also found five anchors near the square. All without exception are of an Y anchor type dated to the Fatimid period (Fig. 2).

All the anchors were found without a stock connected to the shank. This indicates that the anchors were on board and not used for anchoring.

Also, during dives in August 2015, a 5cm long nail, either used in ship-building or part of chest that held the coins was found covered with sediment and encrusted with a dozen gold dinars and quarter dinars. The find of the treasure in the waters of Caesarea’s ancient port, the nearby location of several ship anchors contemporary to the coins, as well as the abovementioned nail, all ostensibly indicate the treasure’s association with maritime activity. Presumably it was located on a ship anchored in the inner harbor which suddenly and violently disintegrated, leading to a dramatic

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17 Hopefully more detailed excavations will be carried out in the future. Maritime excavations in Israel’s coastal waters are complex due to it being a fast-moving environment. The coastal waters of the Eastern Mediterranean are prone to heavy currents and sudden movements of sand deposits. At this moment the site is once more covered with a layer of sand several meters deep.

loss of a very large quantity of gold coins. The Fatimids military and merchant navy played a strategic role in the face of constant incursions of Turkish warlords, Shi’a Qarmatian militias and local Arab tribes in southern Bilad al-Sham during the tenth and eleventh centuries. It secured political and military control over the Eastern Mediterranean seaboard and its ports and cities for the empire’s administration and merchants, as shipping was relatively safe and fast taking only a few days instead of the lengthy dangerous overland route.19

CONTENT

The treasure currently contains 2668 coins. The hoard is made up of only two denominations: 1740 dinars, virtually two-thirds of the hoard (65%), most of them weighing 4 to 4.3 grams of gold. The rest, 928 coins consist of much smaller one-

gram quarter dinar (35%). The combined weight of the coins is c. 7.5 kg of gold (Fig. 3).

Recent preliminary X-Ray Fluorescence (XRF) analysis of dinars and quarter dinars in other contemporary tenth and eleventh century Fatimid hoards, excavated in Bilad al-Sham indicate that these coins are made of extremely pure gold which could vary between 93–99%, which was usual for Fatimid coins of this period.²⁰

The earliest coins in the treasure are quarter dinar minted under the Aghlabid Amir Ziyadat Allah I (816–838), of the semi-independent North African Islamic dynasty in Ifriqiyyah (Tunesia), who conquered Byzantine ruled Sicily and eventually were overthrown by the Fatimids in 909 CE. However, most of the treasure’s coins, were minted in the reigns of three successive Fatimid caliphs, Al-Aziz Billah (AH 365–386/975–996 CE), Al-Ḥakim (AH 386–411 = 996–1021 CE) and his successor Al-Ẓahir (AH 411–427 = 1021–1036 CE). The coins of al-Zahir constitute

the latest datable group of coins in the hoard. The treasure belongs to an important
group of nine Fatimid treasures deposited or lost during the early eleventh century
in Southern Bilad al-Sham.

Many of the coins are clipped, cracked and worn, proof of their continuous circu-
lation but quite a few are in very fine condition – as if they were just minted and had
not yet circulated (Fig.4).

A considerable number of coins are bent and even carry signs of teeth marks,
evidence that contemporaries used regularly to check the quality of the gold. Many
of the coins also still show signs of incrustation, the result of laying more than a
thousand years on the seabed (Fig. 5).

Once it was established that the latest coins in the treasure date to the reign of
al-Zahir, the next task was to establish the latest documented date among the coins
of this group. This date provides the *terminus post quem*, the earliest possible date
of deposition or loss of the treasure, of cardinal importance for understanding the
circumstances in which the hoard was lost. For this each of the 508 dinar and quarter-
dinar, belonging to this ruler, were read. Of these, 373 coins had legible dates.21

One date had a special significance: the year AH 425 (1033/34 CE). Written
sources – among them a letter preserved in the Cairo Genizah - demonstrated that
Fatimid Palestine was ravaged in December 1033 by a strong earthquake, followed

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21 Among the remaining 135 coins, dates were found to be either missing or the coins were simply
undated.
by a huge tsunami sweeping the coast. Could it be possible that the treasure was lost in the terrible tsunami that swept the coast in that year? If so it would constitute a unique piece of archaeological evidence for a major geological event. Unfortunately, this working hypothesis had to be abandoned since the treasure contains at least 12 coins with the date 426AH, between November 16, 1034 and November 4, 1035 CE. These coins convincingly demonstrated that this large treasure either reached or left Caesarea at least a year after the tsunami hit the coast in force.

So, what were then the circumstances in which this hoard was lost? Prior to a detailed study of the coins several scenarios were suggested: was it locally farmed tax money leaving the harbor on its way to the Diwan al-Sham, the department dealing with Syria in the Bayt al-Mal, the Fatimid treasury in Cairo? A consignment of money from merchants whose ship suddenly sunk in the harbor? Or possible wages for the Fatimid military garrison stationed at Caesarea? The answer lies in a minute analysis of the treasure’s contents. Apart from the treasure’s archaeological context, it is principally the enormous number of coins and the wealth of information they provide – types, names of rulers, mints and the dates struck on the coins – which presents a unique opportunity to attempt a reconstruction of the events during which this consignment of gold arrived and was lost. In turn, this will allow us to better understand the broader, supra-regional scale of the circulation of cash gold money and the economic realities of early 11th century Fatimid rule in Egypt and the Eastern Mediterranean.

READING FATIMID COINS

The strict formulistic repetitive structure of Fatimid coin inscriptions simplifies their research to a substantial degree. Fatimid coins adhere basically to several set rules: the mention of the 'Shahada' "There is no God but Allah" and the proclamation of Muhammad as prophet. Since the Fatimids were Shi’ites of the Ismailiyah branch their coins extended the Kalima to include mention of Ali and conferred the title of

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22 CAIRO GENIZAH T-S 18J3.9.1r “They came out of the houses into the streets because they saw in the houses that the walls were buckling back and forth, and the beams were flexing in and out of position in the walls. The fortified structures collapsed, and the new dwellings were thrown down, and many died under the rubble because they had no means of escape. Everyone came out of their houses, each one leaving behind all that they had, and fled for their lives...the tongue is inadequate for the tale. Were it not for God’s mercy that it happened still in daylight, when people could see and warn each other...”. Thus, wrote Solomon ben Shemah, a Jewish inhabitant of Ramla, who survived earthquake, to acquaintances in Fustat, 425AH/1033 CE.

23 These consist mostly of dinars minted in al-Mansuriyarah and two unrecorded coins: a dinar minted in Filastin and a quarter dinar from the Siqilliyyah mint.
‘Imam’ on the reigning ruler. The coins show a set of eight Quranic verses, amongst which Sura IX (al-Tawba), verse 33, appearing on Islamic coins since the Umayyad period, is the most common one. Common to Islamic period coins, Fatimid dinars and fractions mention on the obverse or reverse margins of their coins the mint and the hijra year in which they were produced. However, what makes these coins at times very difficult to read is their use of a compact square Kufic script, the Arabic script used on coins during the first five centuries of Islam. These coins show a particularly densely written Kufic script with letters linked together like in cursive, changing shape depending on their location in a word. Letters are so similar in shape that reading these coins, particularly the mint name and date becomes a daunting epigraphical challenge. Fatimid coins also number a large variety of types, some of them with minute variations. This is amply reflected in the hoard’s contents.

ANALYSIS

DISTRIBUTION BY RULERS

The coins in the treasure span a period of 220 years. Six of the earliest coins belong to the ninth-early tenth century Aghlabid rule over North Africa and Sicily (since 827 CE) and events that followed their overthrow by the Fatimids. These are all quarter dinar, of the Aghlabid emirs, Ziyadat Allah I (817–838 CE), Ibrahim II (875–902 CE), and the rebellious pro-Abbasid wali, governor, of Sicily, Ahmad bin Qurhub (913–916 CE) minted in AH 302–914/15 CE. These coins span a period of c. 98 years.

The majority of coins in the hoard though, are of six Fatimid rulers: a small group of eleven dinars of ‘Ubayd Allah al-Mahdi billah (AH 297–322/910–934 CE), the founder of the Fatimid caliphate, minted in the trading towns of Sijilmassa in southern Morocco and al-Qayrawan, on Tunisia’s coastal plain; a single dinar of Al-Mahdi’s successor, al-Qa’im (934–946); and five dinar struck during the reign of al-Mansur (946–953) at al-Mahdiyah and his newly constructed capital, al-Mansuriyah. To this group also belongs a singular dinar of Hakim II (961–976), the Umayyad

26 Types and sub-types used under Fatimid caliph al-Hakim (996 – 1021) number more than a hundred. See Nicol 2006: pp. 110–131. The Caesarea hoard contains at least 64 different types and variations of which fourteen are completely new and unrecorded. 
27 For Ahmad bin Qurhub (913–916) see Takayama 1992/3: p. 24; For his coins see Bernardi 2010: p. 163.
Caliph of Andalus, minted in Madinat al-Zahra (near Cordoba) in AH 357–967/68 CE. The two above-mentioned groups spanning circa 140 years, represent a small tail of twenty-two coins in the hoard, less than one percent of the identified coins of the treasure.

Charting the quantities of coins in the treasure, shows these are distributed in a very uneven fashion: distribution by rulers demonstrates that more than 97% of the coins were minted between al-Aziz and al-Zahir reign’s– a circa 60-year period between 996 and 1035. If we chart the coin distribution by year the results are even more palpable: most of the coins of the treasure concentrate in the decade of the last years of al-Hakim's rule and the first part of al-Zahir's rule. From the last period of al-Zahir's rule, we only have 19 coins stopping abruptly at 1034/5 c. a year or more before the caliph's death, with a small but highly significant group of eleven coins from AH426 (1034/35). No coins are present of years 427 or 428 (1035-1036), the last years of al-Zahir's reign which is unusual since they are not rare. Finally, there are none of the plentiful gold dinars of his son's Mustansir's long eleventh century reign.

The treasure's internal distribution profile thus clearly reveals an extremely large accumulation of coins near the hoard’s sudden closure in 1035 (Fig. 6).

This, and the absence of coins from the last two years of al-Zahir’s reign seems to indicate that the treasure consisted mostly of money in circulation which was suddenly lost immediately after 1035. The hoard certainly lacks the steady, continuous build-up of a typical savings hoard – in such a case we would have expected much more of the plentiful coins of al-Hakim's predecessor Al-Muizz and Al-Aziz in the hoard.

Figure 6 – Caesarea treasure, distribution by year profile
Distribution by mints

Mapping the mints of coins in a hoard is an important numismatic tool to understand the origins and purpose of a hoard. Often this is a simple enumeration of mints. But in groups with large number of coins – like the Caesarea treasure – quantity-analysis is employed to identify the dominant group of mints, creating a more reliable and balanced image. The case of Caesarea treasure is exceptional since it contains a very large number of coins, something rarely observed in Fatimid period hoards. It is thus ideal for these kinds of analyses.

Coins in the hoard came from a considerable number of mints in North Africa, Bilad a-Sham and even Arabia and the Yemen, twenty in all. Some of these are never or rarely seen in hoards from Southern Bilad al-Sham: Sijilmassa, on the northern edge of the Sahara (southern Morocco) on the route to the gold fields of Medieval Ghana; Qayrawan and Zawilah, a commercial quarter in al-Mahdiyah in Ifriqiyya (Tunisia); Atarblus/Tripoli in Tripolitana and Barqah in Cyrenaica (present-day Libya); Qus in Upper Egypt; and Makkah/Mekka and Medinat Rasul Allah/Madinah in Arabia even several coins from the Yemen.28

![Figure 7 – Caesarea treasure, distribution by mint](image)

(Orange colored dots indicate major mints)

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28 Unrecorded types are present in some 13 of the 20 identified mints. Among these are four rare dinars of Makka/Mecca, one with a yet unpublished date 389AH-998/9 CE minted under al-Hakim. The treasure contains of that same year, another even rarer coin of the mint of Medinat Rasul Allah/Medinah, known until now only for year 453 AH/1061CE during the reign of al-Mustansir.
But turning to quantity analysis we see a more concerted picture of the treasure’s coins emerging. Approximately 89% of the circa 2,100 coins with identifiable mints came in fact from only four mints, active in Sicily, Tunisia and Egypt during the reigns of al Hakim and al-Zahir between 991 and 1035: Al-Mansuriyyah, Al-Mahdiyyah, Siqilliyah and Misr. In contrast, coins from mints near Caesarea and the larger area of Bilad a-Sham amounted to a mere 94 coins coming from five mints, the majority from Filastin/Ramla (Fig. 7).

PRELIMINARY CONCLUSIONS

Evidently the money was not of local origin and seems to have been transported to Caesarea for commercial or military purposes (for example soldiers’ pay). Comparison with other Fatimid hoards from Bilad al-Sham show a similar pattern of money, mostly originating from Ifriqiyyah and Egypt. Clearly, the coins produced in these mints seem to have dominated the coin circulation at this period in Bilad a-Sham and throughout the Fatimid empire. These consisted mostly of a mix of gold dinars and quarter dinars as is sufficiently documented in the Genizah letters and accounts.29

The Genizah texts also demonstrate that merchants, officials and soldiers regularly travelled with large amounts of gold coins, sealed in purses containing 50, 100 and even 300 coins, throughout the empire and beyond.30 What seems to us a very sizable hoard may have been a large but certainly not an exceptional amount of money brought to the coastal city of Caesarea. The hoard simply shows the enormous quantity of gold money available during the Fatimid caliphate fueled by continuous supply of gold arriving from West Africa during the tenth and early eleventh centuries.

Fatimid Caesarea seems to have been a prosperous port time during this period. Planned and constructed by Herod the Great as one of the largest ports in the Roman Mediterranean, Caesarea grew to be the largest city in Roman and Byzantine Palestine and seat of the imperial administration. After the Arab conquest it contracted to a medium sized town, protected by a massive wall constructed in the ninth and tenth centuries.31 Egyptian pottery imports, indicate substantial commercial activity during most of the tenth and early eleventh centuries. Its prosperity is witnessed by

31 AVNI 2014: pp. 49–52. Early Islamic Caesarea had a large congregational mosque. A new street plan was constructed with a sophisticated drainage system.
a large assemblage of brass objects and impressive silver and gold hoards dating to the Fatimid period.\textsuperscript{32}

**IMPORTANCE OF THE HOARD**

The combination of its exceptional size and secure provenance warrants further detailed study and publication of the hoard’s contents. The hoard contains a considerable number of new types and coins with previously unregistered dates (13\% of all coins). Beyond that, data-mining large amounts of information of the rulers, mints and dates mentioned on coins, with their weights and chemical analysis of their gold content, can bring to light important features of the mint policy of the Fatimids now lacking due to the dearth of mint documents from this period. Was Fatimid mint policy centralized or decentralized, independently managed by local governors controlling the mints in their territory? Answering such questions have important implications for the current centralized political and administrative model of the Fatimid empire, underwritten by many historians, archaeologists and numismatists.

Also, the question of the gold content of the treasure’s coins requires further in-depth investigation. At this point, researchers agree that the gold for these coins derived from large amounts of alluvial gold mined south-west of the medieval Soninke kingdom of Ghana situated between the Niger and Senegal rivers, where it was traded and transported to the Fatimid empire.\textsuperscript{33} But gold was also mined in smaller quantities in the eastern desert of Upper Egypt and the Hejaz and possibly other locations.\textsuperscript{34} A future study of gold will have to review the written sources, but

\textsuperscript{32} For the large metal hoard consisting of brass vessels, clay and glass articles see LESTER 2011; 2014: pp. 439–454. The silver and gold treasures (unpublished) consist of two jewelry assemblages found during excavations in 1963 — a hoard of silver bracelets and Green glazed pot filled with gold filigree jewelry — found in a workshop for smelting iron near the medieval port; and an assemblage of 79 dinars found during excavations south of the walled city in 2001, in a Fatimid period graveyard.

\textsuperscript{33} For an up-to-date summary of the gold trade in Medieval Ghana, see XAVIER-FAUVELLE 2013, pp.157–162. Already at the end of the 10th century, the Arab geographer ibn Hawqal estimated the income of the ruler of Sijilmasah (south-west Morocco), a key transit town on the West African gold trade route to North Africa and Middle East at 400,000 dinars a year (1.7 tons of gold). See IBN HAWQAL, p.98.

\textsuperscript{34} An archaeological survey in the Samut District east of Edfu in Upper Egypt suggests that gold mining continued during the Middle Ages. Pers com. of Julien Marchard, Université de Poitiers to Robert Kool, November 8, 2016. Also, in the Hejaz, southeast of Medina, gold was mined in the Middle Ages. An allusion to this is an extremely rare Umayyad dinar, dated 105AH-723/24 CE which mentions on its reverse inscription "The mine of the Commander of the Faithful in the Hejaz" (Ma'dan Amir al-Mu'minin Bi'l Hijaz"). The only provenanced exemplar of this rare coin type was found in a Umayyad period hoard (282 dinars) excavated in Capernaum, on the north west shore of the Sea of Galilee in
above all study the chemical composition of these gold coins, a complex task as gold is extremely stable and does not bind with other metals or alloys.\textsuperscript{35} This we hope will be done in the context of a multidisciplinary study combining geo-chemistry, metallurgy, archaeology and numismatic research.


\footnote{\textsuperscript{35} For example, new applications in the field of Inductively Coupled Plasma Mass Spectrometry (ICP-MS) with a multi-collector analysis seems promising.}
BIBLIOGRAPHY


BERNARDI G., 2010: *Arabic Gold Coins; The First Essay of a Corpus I: From the First Issue ~65H (Hegira Era) = ~684C (Common Era) to the Beginning of the Buwayhid Dominaton 334H (Hegira Era)= 946C (Common Era).* Trieste.


