AAPG2025	ALMACIR	JCJC
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Sciences humains et sociales – Axe D.6 : Études du passé, patrimoine, cultures (CES n°27)		

ALMACIR

AL-Andalus – MAghreb. CIRculation of gold and silver for coinage in the Medieval Islamic West (8th-13th centuries)

I. Pre-proposal's context, positioning and objective(s)

1.1. Project's objectives and research hypotheses

What were the circulation networks for precious metals used in coinage in the Islamic West, from the Arab conquests to the Berber dynasties (8th-13th centuries)? To what extent did political changes in the Maghreb and al-Andalus influence the circulation of precious metals?

The ALMACIR project focuses on the western part of the *Dār al-Islām*, between the Arab conquests of the *Maġrib al-Aqsā* and al-Andalus at the turn of the 7th-8th centuries and the fall of the Almohads in 668/1269. Based on the testimony of written sources, traditional and recent historiography has demonstrated the importance of sub-Saharan gold, and the routes of its circulation transiting through Siğilmāsa [1]. The area was subject to different authorities, with the *Maġrib al-Aqsā* gradually linked to al-Andalus, with the expansion of the Umayyad Caliphate of Cordoba to the south of the Strait of Gibraltar, until the control of Siğilmāsa (366/976), and with the conquests and retreat of the Almoravids and then the Almohads in the 12th and 13th centuries. The project is based on an examination of the circulation of gold and silver in these varying political contexts, through a new light: that of the chemical composition characteristics of coins.

Thus, the aims of the ALMACIR project are 1) to assess the circulation of these metals over a broad chronology covering most of the Middle Ages between sub-Saharan Africa, the *Maġrib al-Aqsā* and al-Andalus; 2) to quantify the evolution of this circulation; and 3) to determine the impact of changes in domination in the region.

The circulation of gold from sub-Saharan Africa to the Mediterranean has been studied mainly on the basis of written sources [2]. A number of analytical studies have also shown that some gold coins in the *Dār al-Islām* were minted with metal originating from sub-Saharan regions [3]. However, given the current state of research, it remains impossible to quantify these contributions and estimate the proportion of sub-Saharan gold in the coinage of al-Andalus. The expected results will therefore aim to determine the dynamics of this circulation, and to reconsider the assumption that it increased with the changes in control over the region, particularly following the Almoravid conquests. On the other hand, silver mines and production sites, as well as prolific mints in North Africa, have been mentioned since the first centuries of the Middle Ages and recent archaeological studies have focused on Saharan mines [4]. While the trans-Saharan route to North Africa and the Iberian Peninsula is essentially presented as a 'gold route', to what extent was silver ore a feature of trade around the Strait of Gibraltar? This approach will be characterised by an uninterrupted chronology of 5 centuries. Indeed, unlike dinars, which were not minted in al-Andalus until the resumption of gold coinage by the Umayyad 'Abd al-Raḥmān III (317/929), silver coins were minted throughout the period studied.

1.2. Position of the project as it relates to the state of the art

The ALMACIR project is based on an interdisciplinary approach to historical and archaeological issues, incorporating numismatics. In this way, it fits in with the dynamics of current research on the medieval Islamic West. Using archaeometry, it offers a new and innovative perspective. The focus is on the analysis of over 220 gold coins (dinars) and almost 550 silver coins (dirhams and *qīrāt-s*) minted by the Islamic States established in the western Mediterranean from the early 8th century to the 13th century. These analyses will be carried out using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS), a non-destructive method of elemental characterisation pioneered by IRAMAT (UMR 7065, the laboratory behind the project) for its application to metal analysis [4, 5].

Coins from al-Andalus between the 8th and 13th centuries have in the past been the subject of analysis, using a variety of methods, often limited to the surface areas of the coin [6], and whose accuracy and

reliability remain unsatisfactory. By carrying out LA-ICP-MS analyses on a vast corpus, the project will establish the first compositional reference system for dinars and dirhams minted in the West. This will allow to examine differences in gold and silver content and trace element characteristics between mints and periods, in correlation with political and economic developments. Some dirhams will also be studied for their lead isotope ratios. This additional data will be compared with that available on the mining operations that produced silver in the Middle Ages in North Africa and Spain. Moreover, the results obtained on dirhams and *qīrāt-s* will offer a renewed vision of the 'silver crisis' in the *Dār al-Islām* around the 11th century [7]. Basic compositional analyses carried out in the past have made possible to formulate hypotheses about the supply of mints that struck dinars in the medieval Islamic West, such as the use of gold from *Bilād al-Sūdān* in 8th century coinage in *Ifrīqiya* [8]. However, the methods employed did not allow a precise determination of all the elements potentially tracing gold, that will be looked for in the LA-ICP-MS analyses, which will involve 220 gold coins from the medieval Islamic West of the 10th-13th centuries. Particular attention will be paid to the content of trace elements known as 'platinoids', which can be used to distinguish gold stocks of different origins.
For silver as for gold, the issue of distinguishing between the recycling of previous coinage and the contribution of new metallic resources will be central.

1.3. Methodology to reach the scientific objectives

The aim of the ALMACIR project is to produce an unprecedented synthesis of our knowledge of gold and silver coins from the medieval Islamic West, to be followed by a campaign of analysis of unparalleled quality and scope. Following the cataloguing and numismatic study of the coins available for analysis, which will be integrated into a database to which the results of LA-ICP-MS and isotopic analyses will be added. Where possible, the coins will be studied according to the archaeological and historical context of coins findings. Comparison with archaeological data, particularly from recent work on the site of Siğilmāsa [9], will allow new interpretations of the production and circulation of precious metals. This method, which is based on 5 Work Packages, will define the trade networks between al-Andalus and North Africa, and with Mediterranean Europe.

Work package 1 - Cataloguing gold and silver coins available for analysis (8th-13th c.)

The study of coins from the collections that will provide the coins to be analysed will allow to retrace the monetary history of the reigning and issuing dynasties in the western Mediterranean basin. In France, the main collection holding such coins is that of the Département des monnaies, médailles et antiques (Bibliothèque nationale de France), an institution with which the laboratory IRAMAT is linked by a partnership agreement since 1975. The BNF could provide nearly 200 dinars and more than 400 dirhams for the period studied (around 80% of the planned corpus).
Other collections will be integrated into the project: in addition to consulting the main Spanish numismatic collections, agreements with museums in some capitals of Spanish provinces will allow to study coins from archaeological sites, such as the 11th century dirham fragments from Las Sillas (Aragon, Spain) [10].

Work package 2 - Creating and feeding the database

The coins will then be recorded in a database, specially created in collaboration with a research engineer whom the laboratory is planning to recruit by 1 December 2024. The database will initially be populated with metadata relating to the coins identified in WP1, with a systematic resumption of numismatic classification and the production of high-definition photographs using IRAMAT equipment. It will provide an unprecedented source of information on the precious metal coinage of the medieval Islamic West, and will be put online before the end of the project, in accordance with the FAIR (Findable, Accessible, Interoperable, Reusable) principles.

Work package 3 - Elemental and isotopic analyses

The analyses of the gold and silver coins described above will be carried out following the progress made in WP 1 and 2 on the cataloguing of the coins and the creation of a database. The basic analyses will be carried out at the project laboratory, by its coordinator and by a team based on members of the laboratory while a service provider will do Isotopic analyses.

Work Package 4 - Survey and synthesis of analysis data
The numismatic and archaeometric study will be compared with data from written and archaeological sources. A survey will be undertaken to compile and incorporate information on the production of non-ferrous metals in West and North Africa between the 8th and 13th centuries. Documents of various kinds will be studied: textual data, geological data (mineral resources), mining archaeology data (structures and furniture), analytical data (ores, slag, etc.). This WP will therefore provide an opportunity to set up a network of researchers from different specialities. To give concrete form to this joint work, the progress of the study will be regularly presented at a seminar organised in Orléans.
Work package 5 - Pooling, reporting and dissemination
The final step of the project will be the pooling of the results obtained on the different data corpora, with the aim of a cross-interpretation aimed at proposing a re-reading of the role of precious metals in the movement of people and goods around the Sahara, in the *Maġrib al-Aqsā* and in Mediterranean Europe.
At various steps of the project, publications will be submitted to international journals in the various fields covered. In accordance with the ANR's Action Plan 2022, these productions will be made available in open access under the Creative Commons CC-BY licence. The project will also lead to the organisation of an international colloquium on the circulation of metals and coins in the medieval Islamic West. The participation of researchers from different specialities in this event bears witness to the originality of a project deeply marked by interdisciplinarity.

1.4. Ability of the project to address the research issues covered by the chosen research theme

The project ALMACIR addresses scientific questions pertaining to the field of Humanities and Social Sciences, dealing with the commercial relationship of medieval Islamic societies (axis D.6). The issues, methods and interdisciplinary structure of the project will shed major light on the interactions between past societies on the scale of the western Mediterranean during 6 centuries. The involvement of many researchers from, firstly, archaeology and history, and, secondly, chemistry, allows a genuinely interdisciplinary dialogue to emerge between different researchers and scientific fields in line with the IRAMAT's scientific policy.

II. Partnership (consortium or team)

2.1. Scientific coordinator

Sébastien Gasc is an archaeologist who specializes in the coinage of Islamic Medieval West, especially those minted in al-Andalus. He completed a PhD (2015, University of Paris IV Sorbonne), focusing on 8th and 9th centuries coins findings and hoards in the North of the Iberian Peninsula. After his PhD, he has worked for various universities, published around 15 articles about Islamic medieval numismatics, including a study on the circulation of coins between North Africa and al-Andalus [11], and co-wrote a book dedicated to an important archaeological site in northern al-Andalus. Since 2023, he is a CNRS researcher (IRAMAT, UMR 7065). In this project, he will be particularly involved in coordination activities, numismatics studies, constitution of the dataset and integration of all scientific results.

2.2. Scientific coordinator's team

The complementary expertise of the permanent members of IRAMAT is a major asset to the project. Guillaume Sarah is a specialist in silver-copper alloys, while Maryse Blet-Lemarquand is a specialist in the archaeometry of coined metals, particularly for the analysis and tracing of gold coins. In addition to their expertise, they will both be involved in carrying out the analyses. Florian Téreygeol, a specialist in mining and metallurgical archaeology, who has notably worked on a major silver mine in Yemen and its production in the Middle Ages [12], will be contributing his expertise on the history of medieval mining of non-ferrous metals and the study of metallurgical artefacts.
Numismatic analysis will benefit from the expertise of Marc Bompaire, director of research and one of the leading specialists in medieval numismatics and monetary history. A researcher on fixed-term

contract will also be recruited for a period of 36 months, in the form of funding for a doctoral thesis, on the theme of the coinage of the Taifa kingdoms (11th century), a period for which the imperfectly known coins are a source of great interest. The PhD student will contribute to the identification, selection and cataloguing of coins.

The project is also based on the partnership established by IRAMAT with the Département des Monnaies, médailles et antiques (BnF) directed by Cécile Colonna, Paul Froment being in charge of the foreign coin collection. Main institution providing coins for study and analysis, the BnF will be involved in the project as a non-beneficiary partner.

2.3. Coordinator's level of responsibility / adequacy to the JCJC instrument

The project will allow the coordinator to fully integrate his research into his laboratory. With his multidisciplinary profile, he will be able to coordinate the various stages of the project and the laboratory will benefit from his research dedicated to Islamic coinage, which until now has been few studied by IRAMAT. He will also be putting his networks in Spain and North Africa to good use, working with Spanish and Moroccan institutions and researchers.

In addition to his scientific responsibilities, he will be in charge of the events planned as part of this programme, including seminars and an international symposium. He has already demonstrated his ability to organise these events during his doctoral studies, when he had organised two colloquia, one of which international. He will also be in a position to supervise the work team, in line with his archaeological experience, since he's leading excavation campaigns in Aragon for 11 years.

III. References

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