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SCIENTIFIC ADVANCEMENT AND THE LEGACY OF ISLAMIC CIVILIZATION IN ANDALUSIAN HISTORIOGRAPHY

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ABSTRACT

This article aims to examine the scientific advancements and legacy of Islamic civilization in Spain (Al-Andalus) as represented in Islamic historical literature, as well as to analyze the position of Andalusia within the historiography of global science. The central research problem explores how the concept of science in the Islamic tradition developed in Al-Andalus, the forms of scientific progress that emerged, and the ways in which both classical and modern historical sources construct narratives about Islamic Spain. This study employs a literature review design, analyzing Islamic history books, internationally indexed journal articles, and the works of classical Muslim historians alongside modern scholars. Data were collected through thematic literature exploration and evaluated using content analysis and historical synthesis. The findings reveal that Al-Andalus functioned as a major center of scientific civilization, contributing significantly to medicine, mathematics, astronomy, philosophy, and applied technologies, supported by an epistemological framework that integrated religion, reason, and knowledge. Furthermore, modern historiography indicates a paradigm shift away from Eurocentric narratives toward a more balanced recognition of Islamic scientific contributions. This article concludes that the legacy of Islamic civilization in Spain not only played a crucial role in shaping medieval European intellectual development but also provides a valuable model for contemporary studies of Islamic history and science, despite limitations related to a reliance on secondary sources and translated manuscripts that warrant further research.

I. INTRODUCTION

The history of Islamic civilization in Spain, particularly in the region of Andalusia (756–1494 CE), holds a pivotal position in the narrative of global scientific and cultural development (Masruri, 2017). This era is widely recognized as a period when science, philosophy, and the arts flourished under Islamic governance. Al-Andalus served as a vital conduit for the transmission of classical Greek knowledge, laying the groundwork for subsequent European intellectual growth during the Renaissance (Goody, 2012; Halilović, 2017). Cities such as Córdoba, Toledo, and Granada emerged as premier centers of learning, featuring expansive libraries, madrasas, and translation bureaus that facilitated vibrant cross-cultural exchanges among Muslim, Jewish, and Christian scholars (Hitchcock, 2008). Consequently, the golden age of Andalusia was not merely a regional phenomenon, but rather a crucial phase in global history that enabled the systematic transfer of knowledge from the East to the West.

This progress not only gave birth to great scientists such as Ibn Rushd (Averroes), Al-Zahrawi, and Ibn Arabi, but also marked the successful synthesis between Islamic spirituality and scientific rationality. According to Seyyed Hossein Nasr, science in Islamic civilization is rooted in the cosmological view of tawhid (divine unity), which views nature as a direct manifestation of divine order (Nasr, 1989). This conceptual framework rendered scientific advancement in Al-Andalus inseparable from the ethical and spiritual dimensions of Islam.

A literature review approach was selected for this study because it is particularly well-suited to exploring and comparing the views of historians, philosophers, and modern scholars regarding the contributions of Islamic science in Al-Andalus. Snyder (2019) emphasizes that literature reviews do not merely aggregate previous research, but rather maps the conceptual and theoretical trajectory of an academic discipline. In this context, this methodological approach enables the examination of the continuity of ideas and the long-term influence of Islamic civilization on European scientific traditions. In line with Boote & Beile (2005)'s framework, this method also serves to assess the rigor of existing academic arguments while identifying novel research gaps within the broader discourse of Islamic historiography.

This study focuses on the development of science and scientific institutions in Al-Andalus during the Islamic Golden Age, with particular emphasis on the disciplines of astronomy, medicine, mathematics, and philosophy. Political and military dynamics are discussed only insofar as they relate directly to the intellectual advancement of Andalusian society. As argued by Hill (2007), the progress of Islamic technology and science cannot be isolated from an underlying scientific culture that deeply valued observation, experimentation, and rationality. Therefore, the scope of this study is restricted to highlighting the intricate interplay among Islamic values, institutional educational structures, and globally impactful scientific achievements.

The main purpose of this article is to demonstrate how Islamic civilization in Spain served as a center for the integration of classical and modern knowledge, emphasizing that scientific progress in Al-Andalus was an organic extension of the intellectual heritage of Islam. While previous studies, such as those by Goody (2012) and Halilovic (2017), frequently focus on the historical transmission of specific sciences to Europe, this study distinguishes itself by analyzing the epistemological continuity between Islamic scientific traditions and modern science through a dual-perspective synthesis of classical Muslim historiography and modern scholarly analysis. As emphasized by Bakar, (2016), knowledge in Islam is not merely rational but is deeply rooted in spirituality and morality. By bridging the normative-moral views of classical historians with the multidisciplinary-critical approaches of modern scholars, this article offers a more balanced framework that positions Al-Andalus as an autonomous center of scientific production rather than a passive intermediary. Ultimately, this study provides a unique conceptual contribution to understanding Islamic science as a universal and transhistorical heritage.

II. METHODS

This study employs a qualitative, library-based research design, focusing on the systematic analysis of academic literature regarding the intellectual progress and historical heritage of Al-Andalus. This approach was selected because it facilitates a thorough exploration of diverse historical sources, classical texts, and contemporary research to achieve a comprehensive understanding of the dynamics of scientific development within the broader context of Islamic civilization (Asmamatin & Ferianto, 2023).

The data sources include classical and modern Islamic history books, Scopus-indexed scientific journal articles, and translated manuscripts, ranging from foundational 10th-century texts to contemporary publications from the last decade, specifically between 2014 and 2025. According to Günther (2005) and Ali & Ramli (2018), research on Islamic history requires triangulation of sources in the form of historical texts, archaeological findings, and philological studies to obtain an objective and contextual picture.

The research was conducted through a systematic four-stage process: it began with heuristics to gather relevant sources from academic databases like Scopus and Cambridge University Press using thematic keywords; this was followed by source criticism to evaluate the credibility of classical and modern literature; then thematic content analysis to interpret the contributions of Al-Andalus scientists and finally historical synthesis to construct a narrative of the evolution of Islamic science in a cross-cultural context, explaining the continuity between intellectual heritage and modern civilization (Ichsan, 2020; Qidwai, 2024).

III. RESULT AND DISCUSSION

The Concept of Science in Islamic Tradition

In Islamic scholarship, the term “science” (*‘ilm*) is not merely understood as empirical observation, but as a system of knowledge rooted in the principle of tawhid—the oneness of God as the ultimate source of all knowledge (Faruqi, 2007; Montazeritabar, 2019). Within the context of Islamic civilization, *‘ilm* encompasses both revealed religious knowledge and rational knowledge (*al-‘ulum al-‘aqliyyah*). Both streams originate from the human intellect, which is viewed as a divine gift bestowed to understand His creation (Sappe, 2020). Al-Farabi and Ibn Sina emphasized that science serves as a vital pathway to achieve wisdom, representing the perfection of knowledge regarding God and the universe (Erdem, 2022; Mahdi, 1975). his holistic view fundamentally distinguishes Islamic epistemology from the modern Western paradigm, which largely separates science from metaphysical values. In contrast, the Islamic scientific framework is inherently integrative, seamlessly connecting empirical, rational, and spiritual dimensions. According to Alatas (2006), this conceptual framework produces an ethical knowledge system, in which the pursuit of knowledge must be oriented toward human welfare and devotion to the Creator (Haidary et al., 2024).

In the Islamic tradition, religion and reason are not viewed as opposing entities, but rather as two complementary instruments for discovering truth. Al-Ghazali, in *Ihya’ ‘Ulim al-Din*, asserts that reason is a light bestowed by Allah to guide humanity in recognizing the truth of revelation (Al-Ghazali, 2011). Ibn Rushd then reinforced this view with philosophical arguments in *Tahafut al-Tahafut*, asserting that no fundamental contradiction exists between philosophy and Sharia because both originate from the same source: Divine truth (Ibrahim & Efremova, 2020). This harmonious relationship catalyzed the birth of a productive scientific civilization across the Islamic world, including Al-Andalus. According to Hoodbhoy, (1991), the rational spirit of early Islam encouraged the integration of natural science and theology, resulting in a worldview that positioned scientific inquiry as a form of worship and a reflection on the orderliness of God's creation. The integration of religion and science was not merely a theoretical ideal, but a reality that was clearly manifested in Al-Andalus. As emphasized by Safvet Halilović (2017), Andalusian civilization was characterized by a balanced framework that harmonized empirical inquiry with religious belief, seamlessly integrating material progress with moral, spiritual, and eschatological values.

Scientists within Islamic civilization were recognized as ‘ulama and hukama’, who held high social and spiritual positions. They served not only as empirical researchers but also as guardians of the ethical and moral dimensions of knowledge. Ibn Khaldun wrote in his *Muqaddimah* that the progress of a civilization is largely determined by its appreciation of science and its intellectual

class (Khaldun, 2004). In Al-Andalus, scientists such as Ibn Rushd, Al-Zahrawī, and Ibn Bajjah played an important role in developing educational structures and rational learning systems that would later profoundly influence early European universities (Daud, 2014; Sotvoldiyev, 2024). As noted by Saliba (2007), Islamic civilization created a model of a knowledge society that placed science at the core of social progress. The relationship between scientists and rulers in the Islamic world also demonstrated institutional support for scientific research and innovation, for example, the establishment of Bayt al-Hikmah and the Córdoba library as centers for translation and research (Surtikanti, 2018).

The Background of Islamic Civilization in Spain

Islam entered the Iberian Peninsula in 711 CE through a military campaign led by Ṭariq ibn Ziyad under the auspices of the Umayyad Caliphate (Hinkle, 2009). After defeating the Visigothic King Roderic at the Battle of Guadalete, the region was systematically integrated into the Islamic world and became known as Al-Andalus. Within a short period, the new administration introduced not only a novel political paradigm but also distinct social, economic, and legal structures that departed significantly from the preceding Visigothic system (Kennedy, 2014).

Since the reign of 'Abd al-Raḥmān I (756–788 AD), Al-Andalus became an important part of the Islamic world with the establishment of the Emirate of Cordoba, which operated autonomously from Abbasid rule in the East (Hinkle, 2009). The process of Islamization and Arabization across the Iberian Peninsula occurred gradually through education, administration, and integration of local culture, rather than solely through military enforcement (Carvajal, 2013).

The golden age of Al-Andalus reached its peak during the Caliphate of Córdoba under the rule of 'Abd al-Raḥmān III (912–961 AD) and his successor, al-Ḥakam II (961–976 AD), who transformed Córdoba into the premier center of governance, commerce, and intellectual life in the Western Islamic world (Kennedy, 2014). The social fabric of Al-Andalus was characterized by ethnic and religious plurality: Muslims, Christians, and Jews coexisted in a relatively tolerant socio-political atmosphere famously termed *convivencia* (Wolf, 2009). The balance between political stability and scientific activity was a key factor in civilization's progress. According to Kennedy (2014), the Umayyad administration's domestic policies prioritized the development of urban infrastructure, massive royal libraries, and robust educational systems, thereby fostering the formation of an elite intellectual and bureaucratic class. Ultimately, the vibrant cross-cultural interactions among Arabs, Berbers, Hispano-Romans, and Jewish communities resulted in a widespread, continuous exchange of knowledge and ideas (Sotvoldiyev, 2024).

Following the decline of Córdoba, the city of Toledo assumed a pivotal role as a center for the translation of science from Arabic into Latin in the 12th century (Burnett, 2001). The Toledo School of Translators brought together Muslim, Jewish, and Christian scholars in an interfaith collaboration that produced monumental translations, including the philosophical and scientific

treatises of Ibn Sina and Al-Farabi. Concurrently, in the south, Granada emerged as the final stronghold of Islamic civilization on the peninsula, successfully sustaining a vibrant intellectual life under the Nasrids until its fall in 1492 (García-Sanjuán & Drayson, 2022). Collectively, these three cities form an intellectual network that demonstrates the integration of Islamic spirituality, scientific rationality, and social tolerance. As concluded by Haqparast & Salangi (2024), Andalusian scientific heritage became the foundation for Europe's intellectual renaissance, particularly in the fields of astronomy, mathematics, and medicine.

The Advancement of Islamic Science in Spain (al-Andalus)

The development of medical science in Al-Andalus reached its peak during the Caliphate of Córdoba, flourishing under the reign of Abd al-Rahman III (Al-Nasir) and continuing under al-Hakam II in the 10th century CE (Tayarani-Najaran et al., 2014). This era was defined by the emergence of scientists such as Abu al-Qasim al-Zahrawi (Albucasis), widely recognized as the father of modern surgery. His work, *al-Tasrif li-man 'ajaza 'an al-ta'lif*, served as the standard medical reference in European universities until the 17th century (Baker & Abdallah, 2020). The surgical contributions of Al-Zahrawi, as highlighted by Zarrintan et al. (2020), demonstrate that surgical practice evolved not merely as a technical skill but as a systematic scientific discipline. Al-Zahrawi successfully designed various surgical instruments and operative procedures that later became foundational to the development of modern surgery. This contribution affirms that the Islamic intellectual tradition played a significant role in establishing the foundations of medical science, particularly in integrating theory and practice in a balanced manner. It further indicates that Al-Zahrawi's innovations were not incidental, but rather the result of a structured scientific approach oriented toward practical human needs.

Al-Andalus also became a center for the development and dissemination of pharmacology and clinical medicine. As researched by Nelson (2025) in *Scientific Innovations in Early Modern Iberia*, Muslim scientists made profound contributions by compiling comprehensive medical encyclopedias and conducting empirical anatomical studies. Furthermore, the institutional presence of sophisticated hospitals (*bimaristans*) in Córdoba and Granada demonstrates a high level of medieval medical professionalism and a remarkably rational, systematic approach to public health (Sahar & Al-Majali, 2017).

In the fields of mathematics and astronomy, Andalusian scientists such as Maslama al-Majriti, Jabir ibn Aflah, and Ibn Rushd (Averroes) played a major role in developing the systems of algebra, trigonometry, and astronomical instruments such as the astrolabe and quadrant (Masood, 2009). The Rius-Pinies study (2020) in *The Routledge Handbook of Muslim Iberia* asserts that Córdoba and Toledo became centers for the translation of Greek and Arabic astronomical texts into Latin, which inspired European scientists such as Copernicus (Fierro, 2020). Meanwhile, Samsó (2025) research reveals that Andalusian observatories applied a

geometry-based observational approach, becoming a model for Renaissance science. This intellectual progress was not limited to the empirical sciences but also included the rational sciences (*ulum al-'aqliyyah*). Philosophers such as Ibn Rushd, Ibn Tufayl, and Ibn Bajjah (Avempace) sought to synthesize Islamic theology with Greek philosophy, primarily through the critical commentary and translation of Aristotle's works into Arabic and Latin. According to Abattouy (2012), these translation activities in Toledo served as an epistemological bridge between the East and the West, creating an intellectual dialogue that influenced European scholasticism. Habti (2011) argues that the Andalusian tradition gave birth to a scientific philosophical paradigm that places reason (*'aql*) as a means of understanding God's creation, without negating revelation.

In addition to theoretical knowledge, Andalusian society excelled in practical technology. Their irrigation systems, such as *qanāt* and *acequia*, enabled sustainable agriculture in arid regions. A study by Ruggles (2025) shows that Andalusian water technology was a combination of local innovations and adaptations of Persian systems, which were later adopted in Valencia and even in Latin America after the Reconquista. According to Luca Balbo & Kirchner (2024), these technological advancements not only supported agricultural productivity but also strengthened the socio-economic stability of Al-Andalus as an advanced urban civilization.

The Legacy of Islamic Civilization in Spain

One of the most monumental legacies of Islamic civilization in Spain lies in its educational institutions and libraries that served as centers of learning, research, and scientific documentation. During the reign of al-Hakam II (961–976 CE), the library of Cordoba housed a collection of over 400,000 manuscripts, transforming the capital into an intellectual magnet for scholars from across both the Islamic world and Christian Europe (Fierro, 2020; García-Sanjuán & Drayson, 2022; Iqbal & Setiawan, 2024). The educational infrastructure in Al-Andalus included madrasas, mosques, and scholarly academies (*majalis al-'ilm*) that taught religious knowledge alongside the rational sciences, including medicine, mathematics, and astronomy (حسن, 2021). Institutions such as the University of Cordoba and madrasas in Toledo and Granada pioneered an integrative educational model, combining theology, logic, and science. It was later adapted by European universities, including Paris and Bologna (Daud, 2014). This tradition reflects the scientific orientation within Islamic scholarship, which frames knowledge as both an instrument of service and advancement of human civilization.

Al-Andalus also served the epicenter of codification and transmitting knowledge. Scientists and scholars authored works in Arabic, which were subsequently translated into Latin and Hebrew, expanding their influence across the Western world. According to Burnett (2001), the Toledo School of Translators marked a turning point in European intellectual history by producing hundreds of translations of works by Muslim polymaths such as Ibn Sina, Ibn Rushd, and Al-Farabi. In addition, the copying and cataloging of manuscripts was carried out intensively in

Cordoba, Seville, and Toledo. (Surtikanti, 2018) notes that Al-Andalus had a system of knowledge distribution through a network of scholars and librarians that ensured the continuity of intergenerational transmission of knowledge. This literacy tradition also includes the writing of multidisciplinary encyclopedias such as the work of Ibn al-Khatib in Granada, which combines medicine, history, and philosophy (Fierro, 2021).

The architectural and urban heritage of Al-Andalus reflects the application of Islamic scientific and aesthetic principles. The Mosque of Cordoba, the Alhambra Palace in Granada, and the Giralda Tower in Seville are symbols of the convergence of geometry, mathematics, and art (Arnold, 2018). Andalusian Islamic architecture prioritizes spatial harmony, natural lighting, and efficient hydraulic engineering. Urban designs such as Cordoba demonstrate a sophisticated grasp of urban planning rooted in civil engineering and environmental management. These innovations in water management through canals, gardens, and ventilation systems represent the applied science. Ruggles' (2025) study confirms that Andalusian palace gardens were designed to be far more than mere aesthetic retreats but also symbolic representing the concept of the cosmos and divine order as described in the Qur'an.

Islamic civilization in Spain cultivated a social framework anchored in scientific literacy and deep intellectual tolerance. The concept of *convivencia* describes the coexistence of Muslims, Jews, and Christians within a shared civil space characterized by scientific cooperation (Menocal, 2002). In this environment, scientific activity was not constrained by religious boundaries but was driven by the spirit of seeking universal truth. Fierro (2020) and García-Sanjuán & Drayson (2022) emphasize that Al-Andalus's scientific culture has created a knowledge society, in which science is part of the social and economic structure. This tradition persisted even after the Reconquista, through its influence on Renaissance humanism and scientific rationality in Europe (Masood, 2009).

Discussion in Islamic Historical Literature

In classical Islamic historiography, Al-Andalus is revered as a symbol of scientific glory and the expansion of Islamic civilization in the West. Al-Mas'udi in *Muruj al-Dhahab* (10th century) described Al-Andalus as a region with a stable system of government and culture, a stability he attributed directly to the harmonious integration of science and religion (Sahar & Al-Majali, 2017). Meanwhile, Ibn Hazm al-Andalusi wrote in *Jamharat Ansab al-'Arab* about the importance of rationality and literacy in constructing Andalusian society (التكريتي, 2021). Ibn Khaldun (1332–1406) in *Muqaddimah* provides an in-depth analysis that the progress of Al-Andalus was the result of strong *'asabiyyah* (social solidarity) paired with a balance between religious knowledge and worldly science (Khaldun, 2004). This classical historian's perspective emphasizes that Andalusian golden age was driven not merely by political power, but also by the scientific spirit and knowledge ethos cultivated by its society.

Modern historiography on Al-Andalus reflects a shift from glorification to critical analysis. Historians such as Menocal (2002) in *The Ornament of the World* and Kennedy (2014) in *Muslim Spain and Portugal* highlight social diversity and interfaith interaction as the foundation of intellectual progress. Conversely, Maribel Fierro (2020) emphasizes the need to view Al-Andalus not merely as the “golden age of Islam,” but as a dynamic space where complex political, cultural, and scientific negotiations took place. The study by García-Sanjuán and Drayson (2022) even criticizes the romanticization of “Andalusian tolerance” (*convivencia*), which is often exaggerated in popular literature, by exposing the deep-seated socio-political tensions that helped shape its intellectual landscape.

This methodological contrasts between classical and modern historians. Classical historians place greater emphasis on morality, religiosity, and harmony between revelation and reason as the sources of civilization. Modern historians tend to use a multidisciplinary approach, combining archaeology, sociology, and philology to explain the material and social causes of Al-Andalus's progress (Carvajal Lopez, 2014; Woolf & Momigliano, 1992). However, both have an important point in common: the recognition that Al-Andalus was a historical space that gave birth to a unique model of scientific civilization, in which the transfer of knowledge from the Islamic world to Europe became an integral part of the intellectual transformation of the West (Daud, 2014). Modern narratives enrich classical understanding by linking it to the context of the globalization of science and colonial politics in the writing of Islamic history.

Literature studies on Al-Andalus are not free from interpretive bias. Classical literature is often normative and apologetic, while modern literature is sometimes trapped in a Eurocentric narrative that sees Al-Andalus only as a bridge to the European Renaissance (Masood, 2009; Nasr, 1989). According to Fierro (2021) and Ruggles (2025), the challenge of modern historiography is to construct a reading that places Al-Andalus as a subject, not merely an object in the history of world civilization. This critical approach opens new opportunities for Islamic history studies to understand the interaction between science, culture, and power in the context of global Islamic civilization.

IV. CONCLUSION

This literature-based study demonstrates that Islamic civilization in Al-Andalus was a major center of scientific innovation and knowledge transmission during the Middle Ages, with institutions in Cordoba, Toledo, and Granada fostering advances in medicine, mathematics, astronomy, philosophy, and technology through an Islamic epistemological framework that integrated faith, reason, and scientific inquiry. The study highlights how Al-Andalus's translation movement and scholarly tradition contributed significantly to European intellectual development and the Renaissance, establishing Al-Andalus as an autonomous and creative center of learning rather than merely a conduct of knowledge. By synthesizing classical Muslim and modern

historiographical perspectives, the research provides a balanced and critical interpretation of Andalusian history while exposing persistent Eurocentric biases. However, its reliance on secondary sources and translated manuscripts limits direct engagement with original Andalusian texts, indicating the need for future research through philological analysis, digital archives, and interdisciplinary approaches to further strengthen the understanding of Islamic civilization's contribution to world scientific history.

REFERENCES

- Abattouy, M. (2012). The Arabic-Latin Intercultural Transmission of Scientific Knowledge in Pre-Modern Europe: Historical Context and Case Studies. *The Role of the Arab-Islamic World in the Rise of the West: Implications for Contemporary Trans-Cultural Relations*, 167–219. https://doi.org/10.1057/9780230393219_8
- Al-Ghazali. (2011). *إحياء علوم الدين* (1st ed., p. 800). دار المنهاج.
- Ali, M. S. B. M., & Ramli, Z. (2018). Islamic Archeology: Reassessment. *Selected Topics on Archaeology, History and Culture in the Malay World*, 19–26. https://doi.org/10.1007/978-981-10-5669-7_2
- Arnold, F. (2018). Mathematics and the Islamic Architecture of Córdoba. *Arts 2018, Vol. 7, Page 35*, 7(3), 35. <https://doi.org/10.3390/ARTS7030035>
- Asmamatin, R., & Ferianto. (2023). ISLAMIC CIVILIZATION, PERIODIZATION, AND DEVELOPMENT IN INDONESIA AND SPAIN AND THEIR EFFECT ON WESTERN CIVILIZATION: A HISTORICAL REVIEW. *JMI (Jurnal Multidisiplin Indonesia)*, 2(6), 1243–1252. <https://jmi.rivierapublishing.id/index.php/rp>
- Bakar, O. (2016). Science and Technology for Mankind's Benefit: Islamic Theories and Practices – Past, Present, and Future. *Islamic Perspectives on Science and Technology*, 17–33. https://doi.org/10.1007/978-981-287-778-9_3
- Baker, D., & Abdallah, Y. (2020). The Revolutionary Role of Abulcasis in the History of Surgery. *International Journal of Human and Health Sciences (IJHHS)*, 4(1), 08–14. <https://doi.org/10.31344/IJHHS.V4I1.113>
- Boote, D. N., & Beile, P. (2005). Scholars Before Researchers: On the Centrality of the Dissertation Literature Review in Research Preparation. *Educational Researcher*, 34(6), 3–15. <https://doi.org/10.3102/0013189X034006003>
- Burnett, C. (2001). The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century. *Science in Context*, 14(1–2), 249–288. <https://doi.org/10.1017/S0269889701000096>
- Carvajal, J. C. (2013). Islamicization or Islamicizations? Expansion of Islam and social practice in the Vega of Granada (south-east Spain). *World Archaeology*, 45(1), 109–123. <https://doi.org/10.1080/00438243.2012.759512>;SUBPAGE:STRING:ABSTRACT;ISSUE:ISSUE:DOI
- Carvajal Lopez, J. (2014). The Archaeology of Al-Andalus: Past, Present and Future. *Medieval Archaeology*, 58, 318.
- Daud, A. H. M. (2014). *The Contribution of Islamic University of Andalusia to Revival Western*

World. 14(5), 14–24.

- Erdem, E. (2022). The Place of God in Metaphysics: A Short Analysis of Ibn Sīnā's Critique of Aristotle. *Studia Philosophica Wratislaviensia*, 17(1), 53–61. <https://doi.org/10.19195/1895-8001.17.1.4>
- Faruqi, Y. M. (2007). Islamic View of Nature and Values: Could These Be the Answer to Building Bridges between Modern Science and Islamic Science. *International Education Journal*, 8(2), 461–469. <http://iej.com.au>
- Fierro, M. (2020). The Routledge Handbook of Muslim Iberia. *The Routledge Handbook of Muslim Iberia*, 1–841. <https://doi.org/10.4324/9781315625959/ROUTLEDGE-HANDBOOK-MUSLIM-IBERIA-MARIBEL-FIERRO/RIGHTS-AND-PERMISSIONS>
- Fierro, M. (2021). The “Bestsellers” of al-Andalus. *Mediterranean Perspectives*, 31–56. https://doi.org/10.1007/978-3-030-53366-3_2
- García-Sanjuán, A., & Drayson, E. (2022). Nasrid Granada: The Case for Spain's Cross-Cultural Identity. *Histories* 2022, Vol. 2, Pages 75–79, 2(1), 75–79. <https://doi.org/10.3390/HISTORIES2010007>
- Goody, J. (2012). The Arabs and the Italian Renaissance. *The Role of the Arab-Islamic World in the Rise of the West: Implications for Contemporary Trans-Cultural Relations*, 25–37. https://doi.org/10.1057/9780230393219_2
- Günther, S. (2005). Assessing the sources of classical Arabic compilations: The issue of categories and methodologies. *British Journal of Middle Eastern Studies*, 32(1), 75–98. <https://doi.org/10.1080/13530190500111134>
- Habti, D. (2011). Reason and revelation for an averroist pursuit of Convivencia and intercultural dialogue. *Policy Futures in Education*, 9(1), 81–87. <https://doi.org/10.2304/pfie.2011.9.1.81>
- Haidary, A. H. Al, Faruqi, A. R. H. Al, MF, A. S., & Maafi, R. H. (2024). Islamic Worldview as a Basis for Islamization of Science Concept According to Syed Muhammad Naquib Al-Attas. *Kalam*, 18(1), 19–36. <https://doi.org/10.24042/002024181145700>
- Halilović, S. (2017). Islamic civilization in Spain - A magnificent example of interaction and unity of religion and science. *Psychiatria Danubina*, 29, 64–72.
- Haqqarast, H., & Salangi, M. M. (2024). *Impact of Islamic Civilization on the European Intellectual Awakening: An Analytical Study*. 2387, 57–62.
- Hill, D. R. (2007). *Islamic science and engineering*. Edinburgh University Press.
- Hinkle, R. C. (2009). *Medieval Islamic Spain (al-Andalus) as a Civilizational Bridge between Later Antiquity and Early Modernity*. 61(61).
- Hitchcock, R. (2008). Christian-Muslim Understanding(s) in Medieval Spain. *Hispanic Research Journal*, 9(4), 314–325. <https://doi.org/10.1179/174582008X325087>
- Hoodbhoy, P. (1991). *Muslims & Science: Religious Orthodoxy and the Struggle for Rationality*. Vanguard. <https://books.google.co.id/books?id=jNRzQgAACAAJ>
- Ibrahim, T., & Efremova, N. V. (2020). Ibn-Rushd (Averroes). The Incoherence of the Incoherence. Part One. *Minbar. Islamic Studies*, 13(3), 605–636. <https://doi.org/10.31162/2618-9569-2020-13-3-605-636>

- Iqbal, R., & Setiawan, A. M. (2024). PERPUSTAKAAN ISLAM CORDOBA: KIBLAT PERADABAN ILMU PENGETAHUAN DI ERA DINASTI BANI Umayyah II 961-976 M. *Batuthah: Jurnal Sejarah Padaban Islam*, 3(1), 1–17. <https://doi.org/10.38073/BATUTHAH.V3I1.1386>
- Kennedy, H. (2014). Muslim Spain and Portugal : A Political History of al-Andalus. *Muslim Spain and Portugal*. <https://doi.org/10.4324/9781315836287>
- Khaldun, I. (2004). المقدمة ابن خلدون - الجزء الاول. https://archive.org/details/diwan_20170911_2151/page/n3/mode/1up
- Luca Balbo, A., & Kirchner, H. (2024). The Archaeology of Field Systems in Al-Andalus. *Agronomy* 2024, Vol. 14, Page 196, 14(1), 196. <https://doi.org/10.3390/AGRONOMY14010196>
- Mahdi, M. (1975). *Science, Philosophy, and Religion in Alfarabi's Enumeration of the Sciences*. 113–147. https://doi.org/10.1007/978-94-010-1781-7_5
- Masood, E. (2009). *Pelopor Hebat di bidang sains Modern* (1st ed.). PT Gramedia Pustaka Utama. https://ia903106.us.archive.org/22/items/etaoin/Ilmuan-Ilmuan_Muslim_by_Ehsan_Masood.pdf
- Masruri, M. H. (2017). MEMBACA GELIAT PENDIDIKAN DAN KEILMUAN DI SPANYOL ISLAM (TAHUN: 756-1494 M.). *J-PAI: Jurnal Pendidikan Agama Islam*, 4(1). <https://doi.org/10.18860/JPAI.V4I1.5280>
- Menocal, M. R. (2002). *The Ornament of the World: How Muslims, Jews, and Christians Created a Culture of Tolerance in Medieval Spain*. Little, Brown. <https://books.google.co.id/books?id=YkQ4nwEACAAJ>
- Montazeritabar, M. (2019). Epistemological Foundations of Natural Sciences in Islam. *Open Journal of Philosophy*, 09(02), 63–71. <https://doi.org/10.4236/OJPP.2019.92006>
- Nasr, S. H. (1989). *Knowledge and the Sacred*. State University of New York Press. <https://books.google.co.id/books?id=4BVXXppKB1IC>
- Nelson, B. J. (2025). Scientific Innovations and Discoveries in Early Modern Iberia. *Scientific Innovations and Discoveries in Early Modern Iberia*. <https://doi.org/10.4324/9780367347093-RERW230-1>
- Ruggles, D. F. (2025). Islamicate Environments: Water, Land, Plants, and Society. *Elements in the Global Middle Ages*. <https://doi.org/10.1017/9781009483384>
- Sahar, & Al-Majali. (2017). Contribution of Medieval Islam to the Modern Hospital System. *Historical Research Letter*, 43(0), 23–28. <https://www.iiste.org/Journals/index.php/HRL/article/view/39153>
- Saliba, G. (2007). Islamic Science and the Making of the European Renaissance. *Islamic Science and the Making of the European Renaissance*. <https://doi.org/10.7551/MITPRESS/3981.001.0001>
- Samsó, J. (2025). S. Mohammad Mozzaffari, Reflections on Observational Astronomy in the Medieval Islamic Period. *Suhayl. Journal for the History of the Exact and Natural Sciences in Islamic Civilisation*, 22. <https://revistes.ub.edu/index.php/suhayl/article/view/52408>
- Sappe, S. (2020). Differences in Knowledge Science in Islamic Education Philosophy Perspective. *International Journal of Asian Education*, 1(1), 1–8. <https://doi.org/10.46966/IJAE.V1I1.22>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal*

of Business Research, 104, 333–339. <https://doi.org/10.1016/J.JBUSRES.2019.07.039>

Sotvoldiyev, O. (2024). Inventions and Scientific Discoveries Of Andalusian Scholars. *Pubmedia Social Sciences and Humanities*, 2(2), 1–8. <https://doi.org/10.47134/PSSH.V2I2.329>

Surtikanti, R. (2018). Libraries of Islam: Religious Traditions of Spreading Science. *KnE Social Sciences*, 3(11 SE-Articles), 221–231. <https://doi.org/10.18502/kss.v3i11.2761>

Tayarani-Najaran, Z., Tayarani-Najaran, N., & Emami, S. A. (2014). The History of Islamic Medicine at a Glance. *Polyphenols in Human Health and Disease*, 1, 17–27. <https://doi.org/10.1016/B978-0-12-398456-2.00003-7>

Wolf, K. B. (2009). Convivencia in Medieval Spain: A Brief History of an Idea. *Religion Compass*, 3(1), 72–85. <https://doi.org/10.1111/J.1749-8171.2008.00119.X;PAGE:STRING:ARTICLE/CHAPTER>

Woolf, D., & Momigliano, A. (1992). The Classical Foundations of Modern Historiography. *Renaissance Quarterly*, 45, 830. <https://doi.org/10.2307/2862640>

Zarrintan, S., Tubbs, R. S., Najjarian, F., Aslanabadi, S., & Shahnaee, A. (2020). Abu Al-Qasim Al-Zahrawi (936–1013 CE), Icon of Medieval Surgery. *Annals of Vascular Surgery*, 69, 437–440. <https://doi.org/https://doi.org/10.1016/j.avsg.2020.07.012>

. *Al-Adab Journal*, 19(19 SE-Other studies), 154–171. ابن حزم بين الدين والفلسفة في كتاب التكريتي, ن. (2021). <https://doi.org/10.31973/aj.v19i19.2160>

حسن, س. ت. س. (2021). جوانب من تاريخ التعليم بالمساجد الأندلسية (8-6 هـ. / 14-12 م.). *مجلة دلالات*, (003)000, 242–221.