

INTRODUCTION

Narratives of Science, Old and New

Hence the humanistic historian must concern himself with the great commitments and loyalties that human beings have borne, with which every sort of norm and ideal has been made explicit; and he must concern himself with the interactions and dialogues in which these commitments have been expressed. Hence, for an “exceptionalizing” historian with such intentions, it is Islamdom as a morally, humanly relevant complex of traditions, unique and irreversible, that can form his canvas. Whether it “led to” anything evident in modern times must be less important than the quality of its excellence as a vital human response and an irreplaceable human endeavor. In this capacity, it would challenge our human respect and recognition even if it had played a far less great role than, in fact, it did play in articulating the human cultural nexus in time and space and in producing the world as we find it now.

Marshall Hodgson, *The Venture of Islam*

OVERVIEW

For this book to tell its story another needs to be untold. This is because the seismic political and intellectual changes that took place globally in the nineteenth to twentieth centuries during successive stages of European colonial and economic expansion and the subsequent periods of decolonization and globalization have profoundly shaped our understandings of the preceding centuries.¹ It has frequently been argued that modernity

¹ As one eloquent example of how our understanding of the Middle Ages came into focus during European colonial expansion, see Kathleen Davis, *Periodization and Sovereignty: How Ideas of Feudalism and Secularization Govern the Politics of Time*. For two masterful

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itself emerged in connection with industrialization in the long European century that began in the eighteenth century with European colonial adventures into the Middle East and Africa and ended with a world war in 1914–18, although it is far less clear what this actually means.² Today, to attempt to reconstruct the premodern, preindustrial societies before this century requires a considerable feat of imagination.³ Our interest here is less the political and economic changes witnessed by this century than the intellectual and cultural shifts that accompanied them, and specifically the ways in which both European and Middle Eastern scholars adopted new definitions of science and religion during the long nineteenth century. Concurrently, and in the context of increasing European colonization of the Middle East, many European Orientalists and traditionally educated scholars in the Middle East came to view the intellectual landscape of the region in the pre-nineteenth century as largely static, and in stark contrast to an earlier period of intellectual fertility.⁴ Unsurprisingly, the lessons that colonial administrators, Middle Eastern intellectuals, and Western Orientalists, drew from this insight differed. For many of the first group, Eastern decadence and weakness justified if not necessitated colonial tutelage. For their part, scholars in the region were divided between those who believed in the necessity of defending the traditional educational institutions and their curricula in order to resist the cultural imperialism of the colonial powers, and reformers who argued for a radical break with the recent past in order to restore the scholarly creativity and vigor of

syntheses on the importance and nature of the changes brought about by the long nineteenth century see C. A. Bayly, *The Birth of the Modern World 1780–1914* and Jürgen Osterhammel, *The Transformation of the World: A Global History of the Nineteenth Century*.

² For a valuable discussion of the problematic fashion in which modernity in the Middle East has traditionally been linked to Napoleon’s invasion of Egypt in 1798 see Dror Ze’evi, “Back to Napoleon? Thoughts on the Beginning of the Modern Era in the Middle East.” On the confusion surrounding the term “modernity,” see Dipesh Chakrabarty, “AHR Roundtable: The Muddle of Modernity.”

³ For one lucid attempt to lay out the differences between our world and the preindustrial one, see Patricia Crone, *Pre-Industrial Societies: Anatomy of the Pre-Modern World*. The story as I present it contains a number of crude generalizations, which need to be nuanced: different parts of the world experienced industrialization at different times, Britain, notably, in the eighteenth and not the nineteenth century. For this and much more, see Robert Allen, *The British Industrial Revolution in Global Perspective*.

⁴ See Indira Gesink, “‘Chaos on the Earth’: Subjective Truths versus Communal Unity in Islamic Law and the Rise of Militant Islam,” and *ibid.*, *Islamic Reform and Conservatism: Al-Azhar and the Evolution of Modern Sunni Islam*. This story is laid out now in Ahmed Shamsy in a fashion that complements Gesink’s analysis, even as it comes to some distinct conclusions, in his *Rediscovering the Islamic Classics: How Editors and Print Culture Transformed an Intellectual Tradition*.

a distant Golden Age. Both groups of local scholars agreed that, in terms of scholarly production, the centuries preceding the arrival of colonial powers were characterized by adherence to tradition, though they differed on its nature and desirability. At the beginning of the twentieth century, and at times in conversation with scholars in the Middle East, Western Orientalists, a group with a diverse set of relations to the colonial project, developed an increasingly consistent argument for the region having long been intellectually dormant.⁵

These narratives that developed in Europe and the Middle East coincided with the emergence among European historians of science in the first half of the twentieth century of the concept of a Scientific Revolution that had taken place in Northern Europe in the seventeenth century and which set Europe alone on a path toward modern science and modernity itself.⁶ The story of the Scientific Revolution drew on the nineteenth-century belief in a historical European exceptionalism and the argument that modernization entailed secularization – the Weberian “disenchantment of the world” – which itself built on a late nineteenth argument that Protestantism – in stark contrast to Catholicism – had helped birth modern science.⁷ The notion that the wrong kind of religion blocked rational thought and historical progress – the latter a notion that acquired greater currency due to the work of nineteenth-century thinkers such as Hegel, Marx, and Burkhardt – was transferred from Catholicism to Islam in greatly divergent ways by the Muslim reformers mentioned above and many of their Orientalist contemporaries.⁸

⁵ Edward Said’s *Orientalism* presented a distorted (if influential) account of European scholars working on the Middle East and North Africa in the nineteenth and twentieth centuries. For an excellent example of a more accurate and productive analysis, see Suzanne L. Marchand, *German Orientalism in the Age of Empire: Religion, Race, and Scholarship*. For Morocco, see the insightful work of Edmund Burke III, *The Ethnographic State: France and the Invention of Moroccan Islam* and Manuela Marín, “Los estudios árabes y el colonialismo español en Marruecos (siglos XIX–XX),” and *Testigos coloniales: españoles en Marruecos [1860–1956]*.

⁶ While generally separate conversations, both narratives emerged from a conviction in European exceptionalism that took on a new character in the nineteenth century. The assumption of the conflation of the Scientific Revolution and modernity is widespread, but see especially Herbert Butterfield, *The Origins of Modern Science: 1300–1800* and then Michael Adas, *Machines as the Measure of Men: Science, Technology, and Ideologies of Western Dominance*.

⁷ The *locus classicus* being Andrew D. White, *A History of the Warfare of Science with Theology in Christendom*, but see also Robert K. Merton, *Science, Technology and Society in Seventeenth Century England* and Peter Harrison, *The Bible, Protestantism, and the Rise of Modern Science*. For a favorable Turkish reading of John W. Draper’s 1874 volume on the *History of the Conflict between Religion and Science*, see M. Alper Yalcinkaya, “Science as an Ally of Religion: A Muslim Appropriation of ‘the Conflict Thesis’.”

⁸ On the broad historical framings of nineteenth century historical thought, see Hayden White, *Metahistory: The Historical Imagination of the Nineteenth Century*. Protestant authors

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Taken together, these narratives suggested that there was little for historians to study when it came to intellectual production, much less the natural sciences, in the Middle East (often conflated with the Muslim world as a whole) following a Golden Age that had ended at some point in the Middle Ages. Over the past decades, historians have readily provided a series of compelling critiques of this story. One lies in exploring how modern science emerged through the interaction of Europeans with their colonial worlds, thus partially de-centering if not provincializing Europe and drawing attention to the ways in which the production of science occurred globally.⁹ Another, related, corrective is to push the date of the importance of the intellectual production of the Middle East for modern science forward from the Abbasid period (750–1258) to the beginning of the Scientific Revolution itself.¹⁰ Still another has been to question the Protestant nature of the Scientific Revolution, with a special emphasis on the intellectual production of Spain and its colonies in the New World.¹¹ As suggested in the Preface, *Revealed Sciences* charts a different path and looks instead at a history of science that is marginal in the genealogy of modern science. In this, it is distinct, but has parallels with recent efforts to recenter the importance of esoteric works in post-formative Islamic thought: in both cases, the aim is to explore and describe histories of rational thought within the category of natural philosophy broadly defined, which have fallen out of the teleological narratives that dominate contemporary histories of science. The most important difference between this book and those who have been writing on esotericism is not only geography, period, or subject matter. Instead of a focus on the natural sciences themselves, here I trace their presence and role in the hegemonic

had used Islam as a foil for criticizing both the Pope and Catholicism since the sixteenth century. For one especially relevant example, see Sonja Brentjes, “Pride and Prejudice: The Invention of a ‘Historiography of Science’ in the Ottoman and Safavid Empires by European Travellers and Writers in the Sixteenth and Seventeenth Centuries.”

⁹ Two examples are provided by Kapil Raj, *Relocating Modern Science: Circulation and Construction of Knowledge in South Asia and Europe, 1650–1900* and Harold Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age*. But see now the collection of articles with the excellent introduction of J. B. Shank, “Special Issue: After the Scientific Revolution: Thinking Globally about the Histories of the Modern Sciences.”

¹⁰ See the contributions to Riva Feldhay and F. Jamil Ragep (eds.), *Before Copernicus: The Cultures and Contexts of Scientific Learning in the Fifteenth Century* and Robert Morrison, “A Scholarly Intermediary between the Ottoman Empire and Renaissance Europe.”

¹¹ See Victor Navarro Brotóns and William Eamon (eds.), *Más allá de la Leyenda Negra: España y la Revolución Científica* and Jorge Cañizares-Esguerra, *Nature, Empire, and Nation: Explorations of the History of Science in the Iberian World*.

Islamic religious discourses of their time: jurisprudence, theology, and, to a lesser extent, Sufism. Writings in the natural sciences themselves, principally astronomy and medicine, while playing an important role in the chapters that follow, are not the primary focus until Chapter 4. I am more interested in following the ways in which the natural sciences and the natural world were inextricably woven into Islamic thought as a whole, in challenging the assertion that Muslim scholars compartmentalized religious and philosophical questions, and in exploring how genre and subject matter were only partially successful in disciplining the natural sciences.¹² In this manner, *Revealed Sciences* moves past the now tired question of the compatibility of science and religion – and especially of Islam and science – as well as the question of the degree and nature of the influence of Muslims and Islam on modernity, to examine the significance of the natural sciences for scholarly individuals and networks that were profoundly religious.

CREATING SCIENCE AND ISLAM: REVISITING TERMINOLOGICAL
 ANXIETIES

During the nineteenth and early twentieth centuries, the disciplines of history and history of science were professionalized in Europe, and subsequently in the United States.¹³ This process went hand in hand with the professionalization of science itself, the term “scientist” famously being coined in 1833 by William Whewell of Cambridge University, who became a pioneer in the field of the history of science by writing both a history and a philosophy of the inductive sciences.¹⁴ Some work was involved in separating science from the natural sciences and natural philosophy, but by the end of the nineteenth century both historians and scientists could speak of science as an intellectual pursuit that had played a central role in Europe’s past and which would continue to drive mankind’s progress forward. Soon after, in the early twentieth century, you could even get a job doing it and not have to rely on private wealth or patronage.¹⁵ All of this is to say that our understanding of science today is decidedly different

¹² The compartmentalization thesis has been eloquently advanced by Ahmed Dallal in *Islam, Science, and the Challenge of History*.

¹³ The literature is extensive. Two places to begin regarding England and the United States are Steven Shapin, *The Scientific Life: A Moral History of a Late Modern Vocation* and Richard Yeo, *Defining Science: William Whewell, Natural Knowledge and Public Debate in Early Victorian England*.

¹⁴ John F. M. Clark, “Intellectual History and the History of Science,” 157.

¹⁵ For this shift from vocation to profession, see Steven Shapin, *The Scientific Life*.

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from that of the natural philosophers of the early nineteenth century, much less those who studied and wrote natural philosophy in the preceding centuries before science acquired its current meaning. The differences are so substantial that they urge us to question the degree to which the classic notion of scientific progression is still sufficient to explain attitudes toward the natural sciences over the centuries immediately preceding the nineteenth century.

Looking at science and its history in this fashion is possible in large part due to the cultural turn in historical studies of the 1960s and 1970s, and what came to be known as the externalist critique of a history of science that limited itself to the internal developments of scientific thought. The practice and results of science were, in this view, constructed, and not facts merely to be discovered.¹⁶ Credit for this shift also lies with Thomas S. Kuhn's 1962 *The Structure of Scientific Revolutions* – which itself drew considerably on Ludwig Fleck's remarkable if neglected 1936 *Genesis and Development of a Scientific Fact* – that offered a sustained critique of the teleological notion of scientific progression that had characterized the nineteenth century and which carries through until today.¹⁷ While Kuhn's theory of successive and incompatible scientific paradigms in which long periods of normal science were interrupted by crisis and revolutionary science that in turn ushered in new periods of normal science remains evocative and is rhetorically impressive, it was more effective in stimulating discussion around the social transmission of science than in producing disciples.¹⁸ Despite these destabilizing and critical interventions from the 1960s onwards that came to occupy a field at times called science and technology studies, the older teleological understanding of the history of science persisted, albeit in some tension with the former.

An example may help clarify what this tension looks like in scholarship. In a series of exchanges in the 1990s and culminating with a debate in the 2000 volume of *Early Science and Medicine*, the historians of Medieval and Early Modern European science Edward Grant and Andrew Cunningham argued passionately over whether Isaac Newton's claim in the *Principia* that he was engaged in natural philosophy meant that he was

¹⁶ See Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science*.

¹⁷ Ludwik Fleck, *Genesis and Development of a Scientific Fact*.

¹⁸ For an insightful discussion of the nature and influence of Kuhn's argument, see Ian Hacking, "Introductory Essay," in *The Structure of Scientific Revolutions*, and for Kuhn's own regrets with the relativistic ways some historians and philosophers used his work, see "The Trouble with the Historical Philosophy of Science." My reading of Kuhn has been influenced by Bojana Mladenović, *Kuhn's Legacy: Epistemology, Metaphilosophy, and Pragmatism*.

doing science.¹⁹ Why did this matter? Grant believed strongly in the steady progression of scientific thought from the Medieval European universities to Newton as father of modern science, and then until today.²⁰ Cunningham, for his part, stressed that precisely because natural philosophy was about explaining the workings of God in the world, and not predicated on establishing natural laws, that the medieval study of natural philosophy up to and including Newton's own work needed to be understood as qualitatively distinct from modern science.²¹ While my own scholarly sympathies are with Cunningham and his consistent focus on refraining from describing the writings of scholars with presentist categories, more important here is that Grant and Cunningham's differences derive in great part from the nature of their questions, which are as incommensurable as their conclusions. Grant was invested in exploring the vibrancy of the rational philosophical heritage of the Middle Ages and in stressing the continuities between the scholarship of that period and of the Scientific Revolution. Cunningham, for his part, although he seldom refers to Kuhn explicitly, comes close to positing the types of epistemological ruptures Kuhn memorably termed paradigm shifts in his contextualization of the conceptual worldviews of European scholars of the seventeenth–nineteenth centuries.

Rehearsing the Grant-Cunningham debate in the context of the emergence of modern science in the nineteenth century helps clarify what is meant in this book by science – a term that will more often appear in the plural, and which simply refers to a discrete body of knowledge that can equally refer to the natural as the religious sciences. I will spend some time in Chapter 2 examining taxonomies of knowledge of seventeenth–eighteenth century Moroccan scholars and will expound there on semantic range of the term science, but wish here to emphasize the term's historical contingency.

What is true for science is also true for religion: the word existed before the nineteenth century but it was during that century that building on changes

¹⁹ I previously referred to this argument in “Writing the History of the Natural Sciences,” 938.

²⁰ Along with the references to Grant's work given in the above-cited article, see the long chapter on the teaching of natural philosophy in the Medieval University in Grant's *God and Reason in the Middle Ages*, 148–206. Grant argues here that the institutionalization of natural philosophy in a separate faculty in Medieval European universities that marginalized theological questions laid the groundwork for the later emergence of Modern Science. See his comments on Newton in *ibid.*, 204–05.

²¹ Cunningham's views on this question are laid out fully in “Getting the Game Right: Some Plain Words of the Identity and Invention of Science.” For his debate with Grant, see the references in Stearns “Writing the History of the Natural Sciences.”

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beginning in the sixteenth–seventeenth centuries, it acquired the meaning we associate with it today.²² In the modern period, the concept of religion comes to entail a series of inner beliefs and external actions as well as implying the existence of a plurality of religions – in this it is not dissimilar from the Arabic word *dīn* in Islamic writings in the premodern period.²³ It was during the sixteenth and seventeenth centuries, however, and as a direct result of a concurrent European and (initially) largely Catholic expansion into the so-called New World on the one hand, and Reformation and Counter-Reformation polemics on the other, that religion became a universal category in European thought, one that could be applied to all peoples. Different from contemporary Western understandings of religion, European scholars of these centuries considered religion most legible in the ritual activities of its practitioners.²⁴ This early modern shift to religion becoming a universal category allowed European thinkers to place the worlds’ peoples into an admittedly changing understanding of a universal history. This growing conceptualization of religion as both universal and historically contingent was accentuated in the Iberian context from the fourteenth to seventeenth centuries by the forced conversion of Jews in 1391, the expulsion of Jews and Muslims in 1492 and 1501 respectively, the concurrent discovery of the “New World,” and then the wave of expulsions of Moriscos (descendants of converted Muslims, many of whom historians now believe were sincere Catholics) to North Africa between 1609 and 1614.²⁵

For Early Modern European scholars, then, religion was first a comparative category, coming into focus at moments of categorization and comparison.²⁶ Its equation with rituals should be contrasted with the

²² For much of this discussion I have benefitted greatly from Guy Stroumsa, *A New Science: The Discovery of Religion in the Age of Reason*, and have also drawn on J. Z. Smith’s ever useful “Religion, Religious, Religions . . .” in Mark C. Taylor, *Critical Terms for Religious Studies*, and Peter Harrison’s eloquent *The Territories of Science and Religion*.

²³ For nineteenth century developments in European thinking on religion, see Tomoko Masuzawa, *The Invention of World Religions: Or, How European Universalism was Preserved in the Language of Pluralism*. A good and for our purposes chronologically relevant overview of the meanings of *dīn* in early modern Muslim scholarship is found in Stefan Reichmuth, “The Arabic Concept of *Dīn* and Islamic Religious Sciences in the 18th Century: The Case of Murtaḍā al-Zabīdī (d. 1791).”

²⁴ See Stroumsa, *A New Science*, chapter One: “Paradigm Shift: Exploring the World’s Religions,” especially at 29.

²⁵ For the ways in which these events relativized religious truth for some, see Stuart B. Schwartz, *All Can Be Saved: Religious Tolerance and Salvation in the Iberian Atlantic World*.

²⁶ In this comparative sense, religion has more in common with the Arabic *milla*, pl. *milal* in the Islamic tradition, usually used to refer to religious communities. For a brief overview of its use in the heresiographic tradition, see D. Gimaret, “al-Milal wa ’l-niḥal.”

interiority of belief, which later came to characterize the concept of religion during the nineteenth century. Within the European context in which this change occurred, it is related to theological debates between Protestants and Catholics during and following the Reformation in the sixteenth century, in which the former critiqued the importance the Catholic Church gave to acts and stressed the radical primacy of the individual's faith in order to attain salvation. The debates continued through the counterreformation into the wars of the seventeenth century and down to the writings of the great social theorists of the nineteenth century mentioned above (Marx, Hegel, Weber).

The point here is not that Enlightenment thinkers in Europe posited the universality of religion for the first time, much less that there was no concept of religion before this period – here I follow Daniel Boyarin's argument that the separation of Christianity from Judaism during Late Antiquity involved conceiving of a multiplicity of religions, including Hellenism.²⁷ Instead, I am offering the weaker argument that during the nineteenth century in Europe scholars came to understand religion much more than previously as a category of beliefs and attitudes that could be attributed a role in supporting or retarding other values or systems of belief such as the newly emerging category of science. And while this new understanding of religion had certainly had much to do with internal arguments within the Christian tradition, it was easily if not readily applied to other religious traditions, Islam being the one we are primarily concerned with here.

The tradition of Western European scholarship that preceded the transformation of the concepts of science and religion in the long nineteenth century had dealt with Islam in a range of ways.²⁸ Whereas Christian scholars in Late Antiquity had successfully (to themselves in any case) explained Judaism as a superseded revelation the true import of which had never been fully understood by Jews themselves, the early Muslim community emerged into a monotheistic Middle East that, for Christian writers, had already witnessed the last true prophets.²⁹ For European Christian observers of Late Antiquity Islam was idolatry, among Catholic scholars it attained the status of heresy in roughly the twelfth century, and for the Protestants of the

²⁷ See Daniel Boyarin, *Borderlines: The Partition of Judaeo-Christianity*, 202–11.

²⁸ The scholarship here is substantial. A good place to start is with Suzanne Conklin Akbari, *Idols in the East: European Representations of Islam and the Orient, 1100–1450* and John Tolan, *Saracens: Islam in the Medieval European Imagination*.

²⁹ For a stimulating overview of the seventh century world of the early Muslim community, see Garth Fowden, *Empire to Commonwealth: Consequences of Monotheism in Late Antiquity* and Fowden, *Before and After Muhammad: The First Millennium Refocused*. For the indispensable survey and analysis of how others viewed the emergence and early

sixteenth century it served in part as metaphor for the error of Catholicism.³⁰ During the nineteenth century, with the ascendancy of a historicist philology, and the awareness that the existential threat posed by the Ottoman Empire in the sixteenth–seventeenth centuries had been tamed, European scholars of comparative religion began to stress how Islam was essentially an Arab faith and not a full-fledged religion.³¹ Among those European scholars who had established their professional credentials through their philological expertise in the languages of the Islamic world – Orientalists – the matter was different. Here, Islam did not represent only a religion (in the newly defined sense encompassing both external acts and professions of faith as well as internal convictions and beliefs) but a way of life, if not a civilization.³² Indeed, many of the most innovative and creative approaches to the concept of Islam at the beginning of the twenty-first century have involved critiquing the many scholars who posited a singular Islamic civilization or culture in the late nineteenth and early twentieth centuries.³³ As European scholars increasingly described themselves as living in a modern, disenchanted world in which religious and secular spheres were neatly divided, they stressed the absence of this distinction in the Muslim world, where everything was subsumed under the rubric of religion.³⁴

Recent trends in the study of Islam as a religious tradition have stressed the diversity of approaches Muslims have taken over time to understanding and practicing their faith. Taking this diversity seriously has involved on the one hand accepting an older anthropological critique of religious studies for privileging elite literate discourses over popular practices when defining orthodoxies, but more pertinently here in a related move it has entailed decentering the privileged place occupied by Islamic law and

expansion of this community, see Robert Hoyland, *Seeing Islam as Others Saw It: A Survey of Christian, Jewish and Zoroastrian Writings on Early Islam*.

³⁰ Such a generalization has value as a heuristic, although it obscures the complex richness of Christian representations of Islam. See for example Tolan, *Saracens*, 51–55, for his discussion of John of Damascus' (d. 749) depiction of Islam as both Christian heresy and idolatry, and compare with Hoyland's discussion of seventh-century Christian authors seeing Islam as a primitive Abrahamic faith in *Seeing Islam as Others Saw It*, 535–38.

³¹ See Masuzawa, *The Invention of World Religions*, 179, and compare with the discussion in Alexander Bevilacqua, *The Republic of Arabic Letters: Islam and the European Enlightenment*.

³² For one example of such an approach, see G. E. Grunebaum, "The Problem: Unity in Diversity."

³³ For two recent, sustained and eloquent critiques of essentializing visions of Islam, see Thomas Bauer, *Die Kultur der Ambiguität: Eine andere Geschichte des Islams* and Shahab Ahmed, *What is Islam? The Importance of Being Islamic*.

³⁴ See chapter 6 of Bauer's *Die Kultur der Ambiguität*, entitled "Die Islamisierung des Islams."