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CRESWELL'S USE OF THE THEORY OF DATING BY THE ACUTENESS OF THE POINTED ARCHES IN EARLY MUSLIM ARCHITECTURE

Historians evolve theories to explain patterns of behavior. Eventually these theories become tools which are used to probe and to expand inquiry and elucidate phenomena. Such a tool — well developed by nineteenth-century historians of the medieval period — was the theory that buildings could be dated by the shape of their arching. Creswell's contribution to this theory was to apply it to early Islamic architecture and, by its use, to derive or substantiate dates for buildings. The dates he put upon them, resting in part upon this theory, have become authoritative, and so this paper is concerned with the effectiveness of the theory and the validity of its results. Its general conclusions vindicate this aspect of Professor Creswell's work.

In using the theory Creswell was not inventing a new concept, but he was breaking new ground. The notion of a persistent and gradual evolution of the acuteness of pointed arches was already current among students of Gothic architecture and figured among their methods for dating and stylistic description. Of this, Creswell was aware. Whether he took the idea from them is uncertain and hardly matters. He applied it to Umayyad Syria with success, basing his dating for a number of buildings largely or partly on the idea.

In Creswell's hands the theory was essentially this: from the Byzantine Empire the Umayyads inherited a

system of round arcading which in the rarest of instances showed a tendency towards becoming slightly pointed. Under Umayyad rule the round arch persisted, but developed into the two-centered form showing an increasing tendency towards pointedness. In the succeeding two centuries the trend was still apparent, but was complicated by the four-centered arch. The pattern persisted, however, explaining the form of arcading used in the tenth and eleventh centuries.

In considering this theory we can look at it in two ways. First, was it a correct tool to use and did the results justify the method? Second, was the material he used accurate and did his errors, if any, lead to false conclusions or significant omissions? But before we do this, we must clarify the theory itself.

A round arch is struck from a single center; a pointed arch has more than one center and can be thought of in its simplest form as being struck from two centers with overlapping arcs which produce an increasingly pointed arch the further they are moved apart horizontally. Separation is measured as a fraction of the span. Each of these two centers can again be divided and, moving apart in the next dimension, i.e., vertically, can produce four-centered curves. The situation can be further complicated by the continuing use of a center moving up and down the vertical axis of the arch to produce a

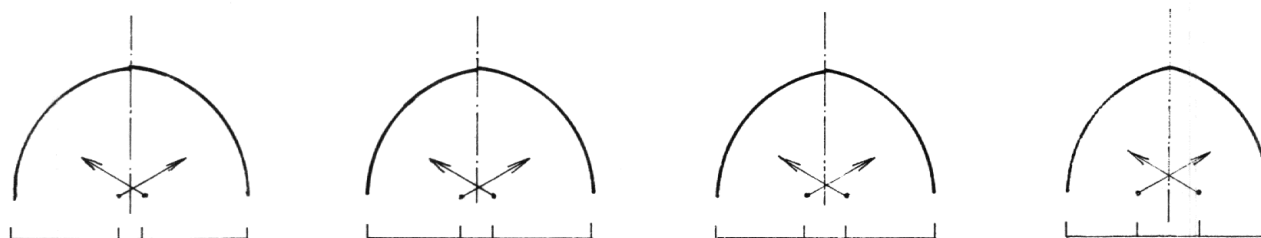


Fig. 1. Diagram showing pointed arches formed with constant radii on centers with successive separation of one-tenth, one-seventh, one-fifth, and one-third of a span.

three- or five-centered curve. Thus a very wide variety of combinations is possible. By implication the theory also postulates progressive acuteness and complexity in the curves. Their visual qualities become a stylistic feature which evolves and hence is a factor of time. It is also circumstantial and therefore indicates both date and origin.

Creswell concerned himself essentially with the geometrically simple phenomenon of an increasing separation of two centers producing an increasingly pointed arch. Starting with separations of less than one-tenth of the span, in which pointedness is barely perceptible, he found that in the first two centuries of Islam separations increased to about one-third of the distance between the springings of the arch. In these the pointed profile is clearly visible. "Even if we omit Qasr Ibn Wardan, the pointed arches of Qusayr 'Amir and Hammām as-Sarakh justify us in saying that this feature is of Syrian origin. And this view is confirmed by the fact that the very evolution of the pointed arch — i.e., the gradual separation of the two centres increases to one-seventh or one-sixth of the span, and at Mshattā to one fifth" (see fig. 1).¹ On the basis of this sequence, he concluded that "the first seven examples of this feature all occur in Syria."

A simple list (see Table of Arch Forms below) made the point adequately and, omissions apart, could be im-



Fig. 2. Arches in the western range of the Great Mosque in Damascus, ca. 715.

Table of Arch Forms

		Date	Separation of centres
Qasr Ibn Wardān	Church, arches under dome	561–4	$\frac{1}{11}$ th of span
Damascus	Great Mosque, arched frame at N. end of transept	705–15	$\frac{1}{10}$ th of span
Qusayr 'Amra	Audience hall, transverse arches	712–15	$\frac{1}{10}$ th of span
Bosrā	So-called "Umar Mosque"	720–1	$\frac{1}{10}$ th of span
Hammām as-Sarakh	Caldarium of bath	725–30(?)	$\frac{1}{7}$ th– $\frac{1}{6}$ th
Qasr al-Hair ash-Sharqī	Mosque	728–9	Very slightly pointed
Mafjar	Sirdāb and portico of forecourt	(729–43)	$\frac{1}{5}$ th– $\frac{1}{8}$ th of span
Mshattā	Section of vaults	744	$\frac{1}{6}$ th of span
Qasr at-Tūba	Section of vaults	744	$\frac{1}{5}$ th of span
Raqqa	Baghdād Gate	772	Four-centred arch
Ukhaidir	Vault of great hall	last quarter 8th cent.	Slightly pointed
Ramla	Arches of cistern	789	$\frac{1}{5}$ th of span
Fustāt	Mosque of 'Amr, windows	827	Slightly pointed
Sāmarrā	Bāb al-Āmma	836	Four-centred arch
Fustāt	Nilometer, recesses	861–2	$\frac{1}{3}$ rd of span
Qairawān	Great Mosque, arches lining transept and under dome	862	Pointed, with slight return
(also Qairawān)	Mosque of Muhammad ibn Khairūn	252 H. (866)	Pointed horse-shoe arch
	Great Mosque, portion of sanctuary	261 H. (875)	Pointed horse-shoe arch
Cairo	Mosque of Ibn Tūlūn	687–9	Irregular, about $\frac{1}{4}$ th of span and stilted

From: K. A. C. Creswell, *A Short Account of Early Muslim Architecture*, ed. J. W. Allan (1989), p. 116.

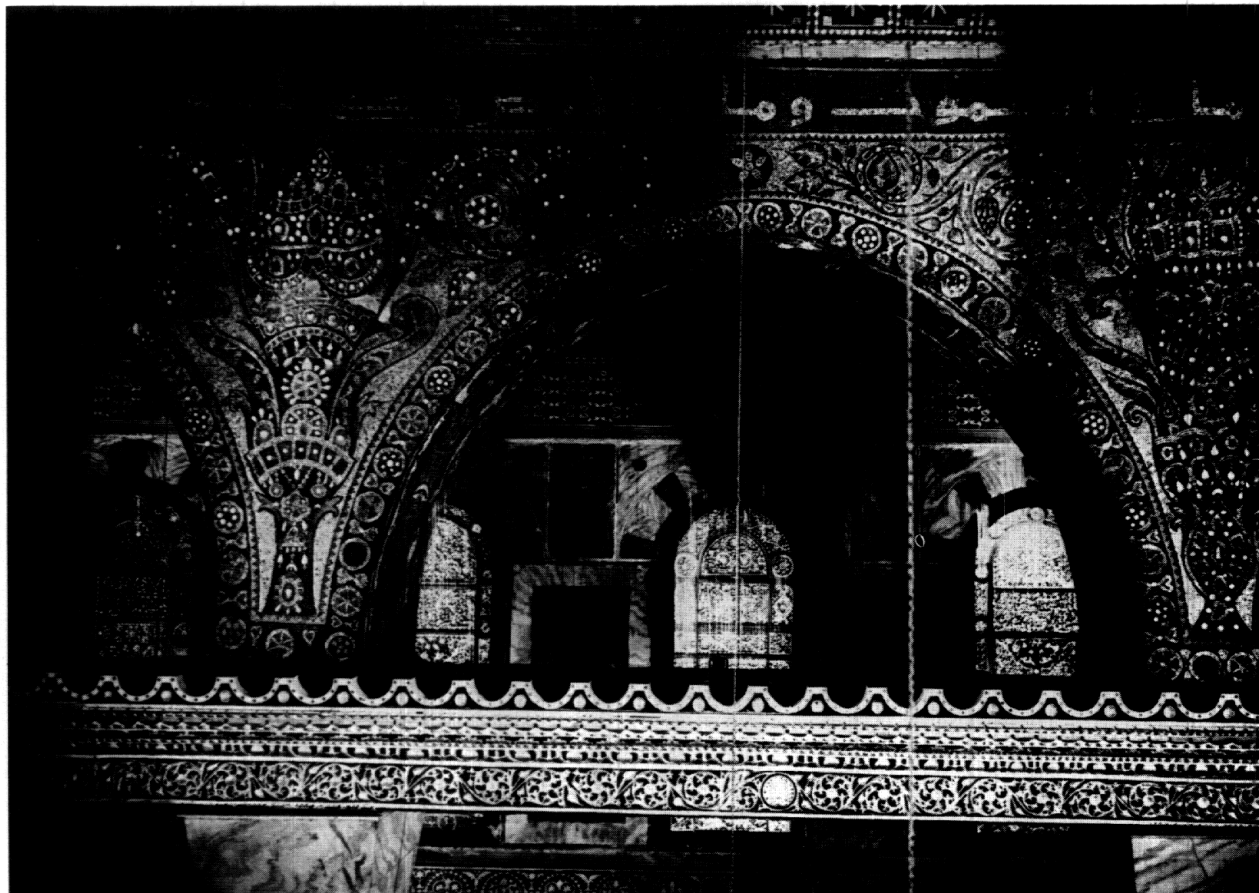


Fig. 3. An arch in the arcade of the Dome of the Rock, Jerusalem, ca. 690. (K. A. C. Creswell, *Early Muslim Architecture* 1,1, fig. 192.)

proved upon only by adding that the peaks of the arches are rounded off (they are never sharply pointed) and that the most measurable of the arches in the mosque at Qasr-al-Hayr al-Sharqi also has separations of one-seventh, fitting his dating perfectly. The omission of the important arches in the side chambers of the Great Mosque at Damascus, however, suggests that the list is selective for these have separations of about a sixth, somewhat disrupting the smooth sequence of the list (fig. 2).

It is surprising that Creswell did not include one of the earliest examples, and virtually the most important — the Dome of the Rock — since the building is dated unarguably and his illustrations show exactly the phenomenon that he was discussing (fig. 3). He might then have written “the first eight examples” and indeed other buildings within his knowledge would have raised the number to ten or a dozen, including the Aqsa

Mosque in Jerusalem, Khirbat al-Mafjar, and the cistern at Ramla. Even the more extensive list published in Creswell’s earlier volumes contains similar omissions. However, the list published in the full edition of *Early Muslim Architecture*² raises other questions of omission, of sequence, and of source. Byzantine and Sasanian examples are noticeably lacking.

The enigmatic example which puzzled him was Qasr Ibn Wardan, a building firmly dated to the reign of Justinian I, and he rightly concluded that the northern great arch still standing in the church there *is* slightly pointed (fig. 4). This he attributed to a local, i.e., Syrian, influence and therefore concluded firmly that Syria was the home of the invention which was later to suffuse so much of the architecture of western Europe. Had he looked more widely in the Byzantine Empire he could have adduced substantial other evidence of the priority of the Greeks: for instance the Karamagara Bridge

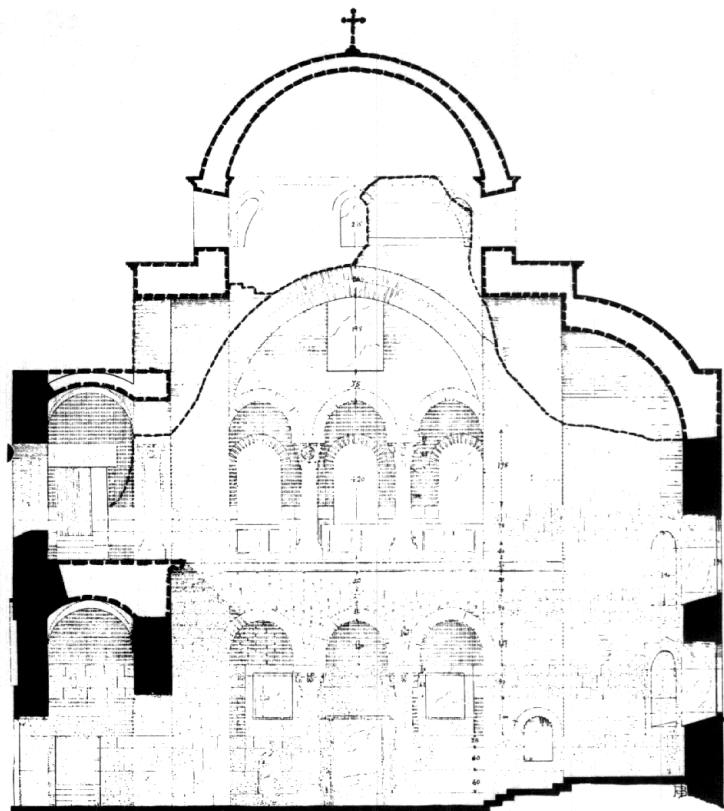


Fig. 4. Drawing of the church at Qasr Ibn Wardan, Syria, ca. 564. (H. C. Butler, amended by the author.)

which spanned the River Murat near Elazig in Asia Minor,³ the slight but certain example of the apse arch of St. Apollinare in Classe in Ravenna,⁴ and the insecurely dated but powerful apse arch of St. Irene in Constantinople,⁵ as well as examples in Syria itself.

In suspecting that pointed architecture was not a Muslim invention he was correct, but in his claim that Syria was the place of its invention, he was wrong for exactly the same reason as was the eighteenth-century poet, to whom all swans were white. Our poet did not believe in the black swan rumored in Australia! Creswell's black swan was the Sasanian Empire where ranges of powerfully pointed arching can be found predating the Muslim era. These he discounted. In Mesopotamian matters Creswell deferred, not surprisingly, to Herzfeld, and Herzfeld had avowed that all Sasanian arches were rounded (*Archäologische Reise*).⁶ In this he led astray his compatriot Reuther, and surprisingly the perceptive Gertrude Bell, whose researches in the region were so extensive. Creswell simply repeated Herzfeld's assertions and looked no further. Travel was not easy in his

time, and he himself was not a great traveler in the sense of adventurers such as Miss Bell. Had he been, he might have discovered some of the many other Sasanian and Byzantine examples which make the pre-Muslim origins of pointed architecture an unassailable contention.

There survived among the pre-Muslim churches of Mesopotamia a series of important examples, some of which Creswell knew by publication. He discussed for instance the martyrion of Mar Tamazgerd at Kirkuk, recorded by Bell before its destruction in the First World War. The acutely pointed arches there find corroboration in other churches of pre-Muslim date, some, such as the church of Mary in Kirkuk, converted to use as a mosque on the Muslim conquest. He discussed also the very early mosque, the Tarik Khana at Damghan in Iran. This building, probably of the Umayyad period, displays steeply pitched arches with intersecting parabolic curves in the arcades of the prayer hall. These arcades run parallel to the qibla axis with a wider central aisle which suggests a date very early in the eighth century, when Friday mosques were modeled on the Aqsa

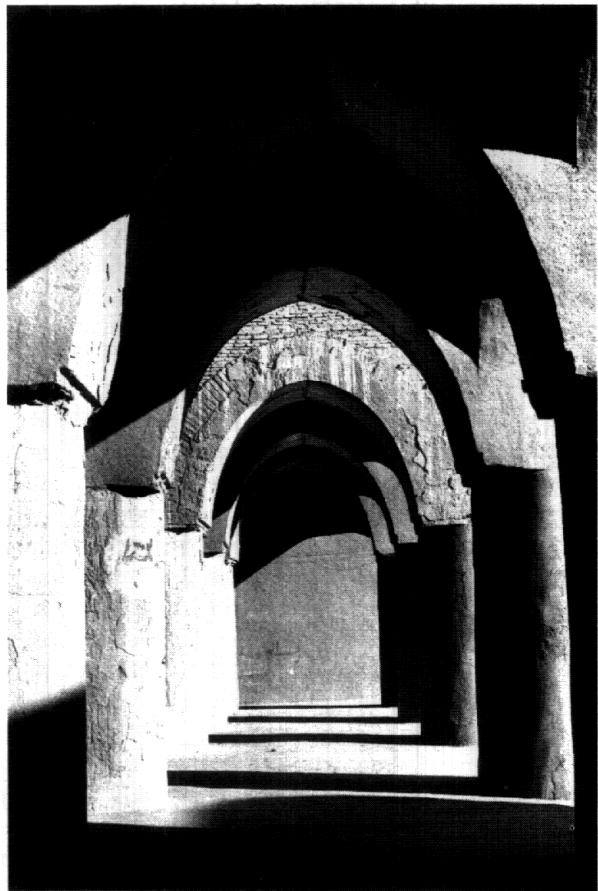


Fig. 5. The longitudinal arcades of the Friday mosque at Damghan, Iran, probably early 8th century. (Creswell, *A Short Account of Early Muslim Architecture*, p. 265, fig. 165.)

Mosque at Jerusalem and before the pervasive influence of al-Walid's great work on the mosque at Damascus, in which the central aisle is flanked by arcades running transversely to the main axis.

Both Kirkuk and Damghan would have alerted Creswell to Herzfeld's error and allowed in his sequence a range of distinctly pointed examples in the Sasanian Empire which are the precursors to the tentative steps he described on the Syrian side of the desert (fig. 5). In particular he might have been drawn to include in his list two salient examples which he believed to have been immediately pre-Muslim, and for which, despite the subsequent evidence for Umayyad occupation, there remain good grounds for pre-Muslim dates early in the seventh century.⁷ They are Qasr Kharana and the qasr on the citadel at Amman (figs. 6–7). Both contain

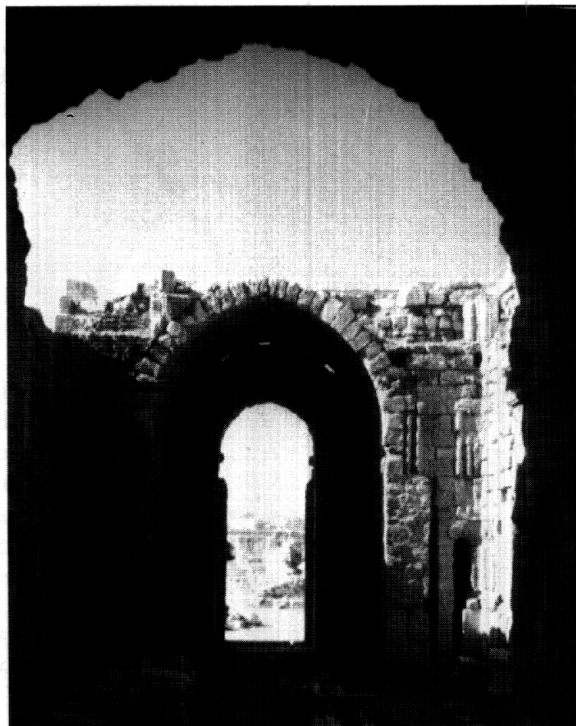


Fig. 6. The northern iwan of the qasr at Amman, Jordan.

slightly pointed arching — in the vaulted ground floor of Karanan and in the iwans at Amman. In neither case has there been found any evidence of a mosque, an invariable part of a major Muslim establishment (with the special exception of Qasr 'Atshan), and both lie on the crucial route from central Mesopotamia to Jerusalem which, with their stylistic attributes, makes them prime candidates for a date early in the sixth century when Palestine had been conquered by Chosroes II (605–14).

Creswell's omission from his lists of the Iranian and Mesopotamian examples he certainly knew may indeed relate to his perception of the pointed arch as of solely Syrian evolution, in which case it must be concluded that he saw Sasanian architecture as the inventor of nothing beyond the "parabolic" arch (which generally is derived from a vertical semi-ellipse). In effect he argued thus: the pointed arch is found evolving in Syria; its evolution must therefore be found in Syria alone, and Mesopotamian pointed arches must be later than Syrian examples. This conclusion, however, is not the only possibility; nor as it turns out is it the correct one. But the lacuna lies in the pre-Muslim period and bears little

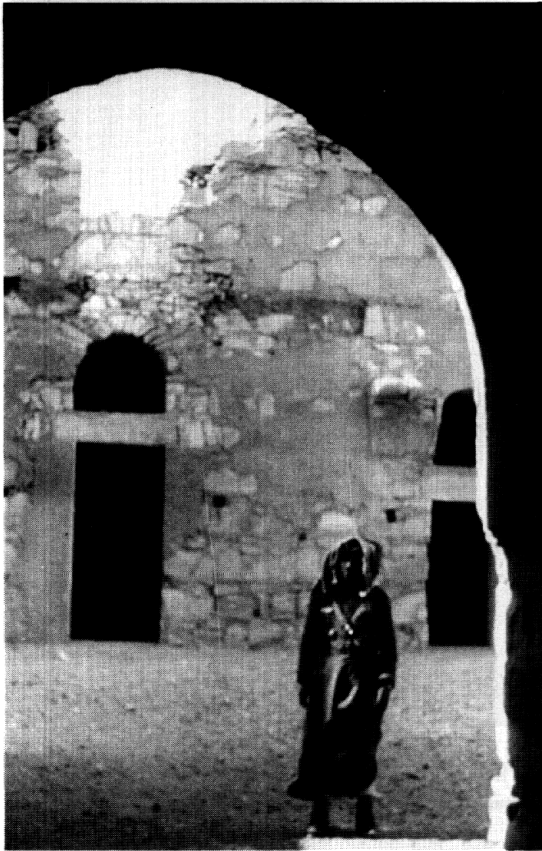


Fig. 7. The entrance vault, Qasr Kharana, Jordan.

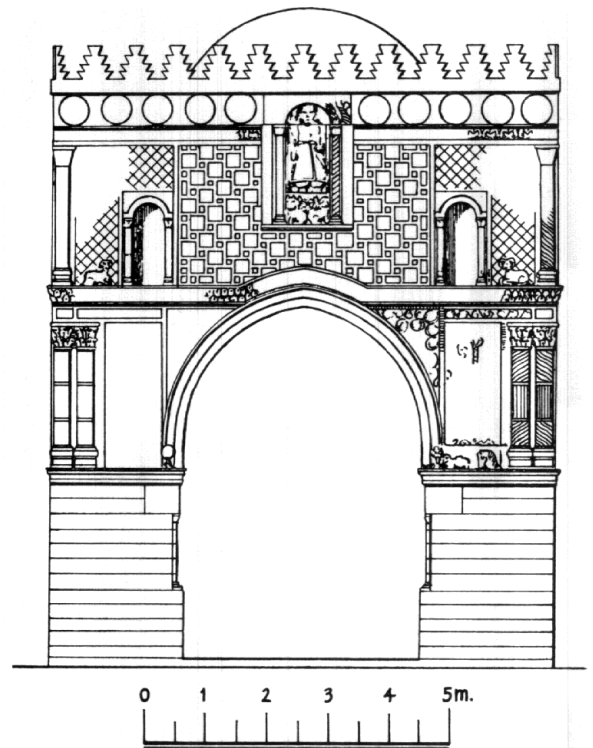


Fig. 8. The reconstructed porch of the bathhouse at Khirbat al-Mafjar, Jordan. (Reconstructed by Hamilton, from Creswell, *A Short Account of Early Muslim Architecture*, ed. Allan, fig. 103.)

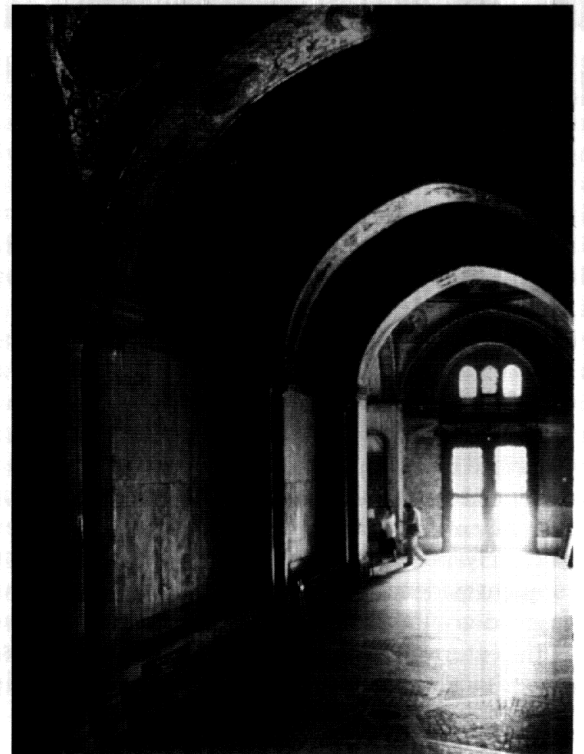


Fig. 9. The northern narthex of San Marco in Venice, originally the atrium of the church built in 829–36.

upon the matters with which Creswell was concerned, even in Iran.

As Creswell knew well, the tool is not precise and margins of error of as much as twenty-five years must be allowed in each direction. Nevertheless subsequent discoveries, such as those at Khirbat-al-Mafjar, have vindicated its use encouragingly. In the late 1940's Robert Hamilton published his meticulous excavations,⁸ showing that the arches of this wrecked Umayyad palace were built with separations of one-seventh to one-fifth, a figure which corresponded nicely with theory for a structure dated for other reasons prior to ca. 743 (fig. 8). This evidence too fitted the theory in its Syrian context, as have other similar revelations. Not only have subsequent discoveries generally vindicated the theory, but the dates which he derived by its use have with few exceptions stood up well to subsequent historical analysis. It might be argued, however, that the theory could have assisted him more in some instances if he had pursued it further and applied it with his customary care and discretion. Thus, had he looked more carefully at the development of arching in Samarra, he would have concluded inevitably that the four-centered arch was developed slowly during the period of the Abbasid Caliphate there. He would consequently have assigned the Baghdad Gate of Raqqa to the post-Samarra period, the tenth or eleventh century, when Raqqa prospered, rather than giving it to the late eighth century, which he did on circumstantial grounds, with the effect of providing a false dating much used by historians for the past forty years. This apart, Creswell's use of the theory in a Muslim context has proved important and valuable.

It is a theory which has also served others well, among them the present writer in following Muslim influence into medieval Europe.⁹ The distinctive profile of the ninth-century arch in the Near East proved the initial clue to a significant cultural event: the removal of Alexandrian Greeks to Italy early in the ninth century.

The church of San Marco in Venice contains pointed arcading which has always been put down as Gothic of

the late twelfth or early thirteenth century, and as such has given rise to the most contorted explanations (fig. 9). In the light of Creswell's theory these arcades take their place as part of the first church built between 829 and 836, and they have led to the conclusion that this first church still exists, encapsulated in the eleventh-century rebuilding. This in turn provides evidence for the transmission from Egypt to Byzantine Italy of a body of men with skills and knowledge, which may well throw further light on the routes by which Europe was influenced by early Islam.

There is no reason why the theory should not have further useful application if it is borne firmly in mind that sequential evolutionary development can be expected only in a relatively undisturbed historical context such as Umayyad Syria. Where an invasive influence was felt, as it was in Tulunid Egypt, the even tenor of change can be disrupted, and its slow evolution is resumed only when the alien influence has been absorbed.

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NOTES

1. K. A. C. Creswell, *A Short Account of Early Muslim Architecture* (Beirut, 1958), p. 103.
2. *Early Muslim Architecture*, 1958 ed., largely repeated in *A Short Account of Early Muslim Architecture*, ed. J. W. Allan (Aldershot, 1989), p. 116.
3. Cyril Mango, *Byzantine Architecture* (New York, 1976), p. 127.
4. André Grabar, *Byzantium from the Death of Theodosius to the Rise of Islam* (London, 1966), fig. 136.
5. Mango, *Byzantine Architecture*, fig. 167.
6. *Short Account* (1989), p. 116.
7. John Warren, "A Sasanian Attribution for Two Buildings in Jordan," *Art and Archaeology Research Papers* 11 (1977): 49-55.
8. R. W. Hamilton, *Khirbat al-Mafjar: An Arabian Mansion in the Jordan Valley* (Oxford, 1949).
9. John Warren, "The First Church of San Marco in Venice," *Journal of the Society of Antiquaries of London* (forthcoming).