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the Origin of Gothic Architecture

William Whewell

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CHAP. I.



OF THE CAUSES OF POINTED ARCHITECTURE.

SECT. 1. *Of the Romanesque and Gothic Styles.*

THE ancient churches of Europe offer to us two styles of architecture, between which, when we consider them in their complete development, the difference is very strongly marked.

During the first thousand years of the Christian period, religious edifices were built in the *former* of these two styles. Its characters are a more or less close imitation of the features of Roman architecture. The arches are round; are supported on pillars retaining traces of the classical proportions; the pilasters, cornices and entablatures, have a correspondence and similarity with those of classical architecture; there is a prevalence of rectangular faces and square-edged projections; the openings in walls are small, and subordinate to the surfaces in which they occur; the members of the architecture are massive and heavy; very limited in kind and repetition; the enrichments being introduced rather by sculpturing surfaces, than by multiplying and extending the component parts. There is in this style a predominance of *horizontal* lines, or at least no predominance and prolongation of vertical ones. For

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instance, the pillars are not prolonged in mouldings; the walls have no prominent buttresses, and are generally terminated by a strong horizontal tablet or cornice. This style may conveniently be designated by the term **ROMANESQUE**. The appellation has been proposed by Mr. Gunn, as implying a corrupted imitation of the Roman architecture: and though the etymological analogy according to which the word is formed, is perhaps not one of extensive prevalence, the expression seems less liable to objection than any other which has been used, and has the advantage of a close correspondence with the word *Romane*, which has of late been commonly employed by the French antiquarians to express the same style. This same kind of architecture, or perhaps particular modifications of it, have been by various persons termed Saxon, Norman, Lombard, Byzantine, &c. All these names imply suppositions with regard to the history of this architecture which it might be difficult to substantiate; and would, moreover, in most cases not be understood to describe the style in that generality which we learn to attribute to it, by finding it, with some variations according to time and place, diffused over the whole face of Europe.

The *second* style of which we have spoken, made its appearance in the early centuries of the second thousand years of the Christian world. It is characterized by the pointed arch; by pillars which are extended so as to lose all trace of classical proportions; by shafts which are placed side by side, often with different thicknesses, and are variously clustered and combined. Its mouldings, cornices and capitals, have no longer the classical shapes and members; square edges, rectangular sur-

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faces, pilasters, and entablatures disappear; the elements of building become slender, detached, repeated and multiplied; they assume forms implying flexure and ramification. The openings become the principal part of the wall, and the other portions are subordinate to these. The universal tendency is to the predominance and prolongation of *vertical* lines; for instance, in the interior, by continuing the shafts in the arch-mouldings; on the exterior, by employing buttresses of strong projection, which shoot upwards through the line of parapet, and terminate in pinnacles.

All over Europe this style is commonly termed Gothic; and though the name has often been objected to, it seems to be not only convenient from being so well understood, but also by no means inappropriate with regard to the associations which it implies. That the Goths as a particular people had nothing to do with the establishment of the style in question, is so generally notorious, that there can be no fear of any one being, in that respect, misled by the term. The notion which suggested the use of the word was manifestly the perception, that the style under consideration was a complete deviation from, and contrast with, the whole principle and spirit of Roman architecture; and that this innovation and antithesis were connected with the course which taste and art took among the nations who overthrew the Roman empire, and established themselves on its ruins. And this is so far a true feeling of the origin and character of the new architecture, that we may consent to accept the word by which it has been thus designated, without being disturbed by the reflexion that those who first imposed this name, considered it as

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conveying the reproach of barbarism. We, indeed, should take a very different view from theirs of the merit and beauty of the new style. We should maintain, that in adopting forms and laws which are the reverse of the ancient ones, it introduced new principles as fixed and true, as full of unity and harmony, as those of the previous system; that these principles were applied with as extensive a command of science and skill, as great a power of overcoming the difficulties and effecting the ends of the art, as had ever been attained by Greek or Roman artists; and that they gave birth to monuments as striking, of as august and elevated a character, as any of which we can trace the existence in the ancient world. Our present business however is not with the merits, but the history, of the art.

The question of the causes of the transition from one of these styles to the other has been much agitated during the last half century. In the course of these discussions “the origin of the pointed arch” has generally been put forwards as the most important branch of the enquiry; a natural result of the common disposition to reduce a problem to the most definite and simple form. This is however an imperfect statement of the real question; for the pointed arch, far from being the single novelty in that change in architecture to which reference is made, is but one among a vast number of peculiarities which, taken altogether, make up the newer style: and this style would continue to exhibit a contrast with the one which preceded it, even if the round arch were used instead of the pointed one, as in some instances is actually the case.

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Still, however, if we could shew with probability the reason which produced the prevalence of the pointed arch, this would be an important step in the history of the architectural revolution, and might throw much light on other parts of this history. Now we can point out a cause, which not only might possibly, but which must almost necessarily, have given rise to the general use of such arches; and it is one object of this Essay to illustrate this necessity, and the manner in which it affected ecclesiastical buildings.

The cause to which I refer, is the mode of VAULTING churches, and the instances in which I have been enabled to trace its operation, are the churches in the neighbourhood of the Rhine principally, and also in some other parts of the Continent.

SECT. 2. *Of the Origin of pointed Vaulting.*

The combination of vaults in the roof of a church is not easy to represent by figures, and hence there is some difficulty in conveying an exact conception of the contrivances which I have to describe. It may, however, perhaps be understood in the following manner.

In a vaulted church, we have in general one vault which runs longitudinally along the church; and the upper windows open into the sides of this longitudinal vault by shorter vaulted spaces, which, running perpendicularly to the length of the building, may be called *transverse vaults*. And the intersection of longitudinal and transverse vaults in this, and similar situations, would naturally lead to the introduction of pointed arches.

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To make this evident, let us consider a single *compartment* of the church, that is, a portion of the center aisle (nave or choir) consisting of one arch, or one window in length, and of the breadth of the center aisle for its breadth. If this length and breadth be equal, such a compartment can be exactly vaulted over by means of semi-circular vaults intersecting each other, and strengthened by semi-circular arches, as is represented in Fig. 1. Each vault may be built exactly as if it were single; the two vaults will meet in an edge or groin of a regular elliptical form, lying diagonal-wise across the compartment, and the lines running along the top of each vault will be horizontal lines. This kind of vaulting was practised by the Romans, and for the sake of brevity I shall call it *Roman vaulting*.

But the case will be different, if we suppose this equality of length and breadth no longer to subsist: if, for instance, the breadth of the window-space be smaller than the breadth of the aisle, as in Fig. 2. If, now, each of these breadths be vaulted over by semi-circular vaults, as in that figure, the transverse vault will not reach to the top of the longitudinal one, but will cut it obliquely in an irregular curve: the line running across the top from one window to its opposite, will be a broken line: the forms will be of some complexity to calculate, and can only be executed by great skill, and with much difficulty. This kind of vaulting is to be seen in modern buildings, for instance, in St. Paul's in London, but may be supposed not to have occurred as practicable to the architects of the middle ages.

If in this case, however, we suppose that the narrower space, (the window) is covered with a *pointed*

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arch *of the same height* as the semi-circle, and with a vault corresponding to this arch, the forms of the vaulting become much easier both to determine and to execute. The lines running along the top, both of the longitudinal and of the transverse vaults, will again be continuous horizontal lines; and the edges formed by the intersection of the two vaults will follow nearly, but not exactly, the diagonals of the compartment. See Fig. 3.

But if instead of supposing one of the vaults only to have a pointed arch for its form, we suppose the longitudinal and transverse arches to be both pointed, and of the same height (which is always possible, whatever be the disproportion of the breadths) the arrangement will become still more convenient. This is represented in Fig. 4. All the divisions of the roof will be of similar forms, and capable of being planned and executed in a similar manner: and the edge or intersection of the two vaults will be more nearly than before in the direction of the diagonal of the compartment, and will also be nearly in the shape of a pointed arch, resembling the original longitudinal and transverse arches.

If we erect, upon each diagonal of the compartment, a pointed arch of the same height as the longitudinal and transverse arches, the vault may, by a slight accommodation of the curvatures, be made exactly to fit this arch. This arch, when marked by a projecting band of stone, is called a *diagonal rib*: and this form of vaulting, with transverse and longitudinal pointed arches, and with diagonal ribs, is the most simple and the most prevalent form which occurs after the completion of the architectural revolution.

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It is not only that the forms and bearings of the parts in this arrangement are more easy and simple than in any other which suggests itself, capable of answering the same ends, but also its strength is more easily secured, and the mechanical construction of the vault much facilitated: the longitudinal, transverse, and diagonal ribs being probably first erected, and then the vaulting parts added, without the necessity of wooden *centers* covering the whole compartments.

This account is not proposed here as new. It is the theory which Mr. Saunders published in 1811, and which he has very ably and ingeniously explained in the 17th volume of the *Archæologia**. In the same volume, Mr. Ware appears to be of a similar opinion, and the same view, or at least one nearly approaching to it, was taken of the subject by Mr. Essex, as appears by Mr. Kerrich's statement (*Archæologia*, Vol. xvi. p. 315.), and seems to be entertained with more or less distinctness by several continental antiquaries. My object is to illustrate the opinion somewhat further, by considering this part of the construction of a church in connexion with other portions of the edifice: and also to shew how the necessity which produced this change shews itself in various buildings in Germany and elsewhere.

It will be observed, that this theory of the origin of pointed arches must be considered as standing upon different ground from other theories which have been

* I may venture to observe, however, that the opinion which supposes Canterbury to be the first instance of pointed vaulting, appears to be untenable.

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proposed, inasmuch as they only shew how the *form* of such an arch *may* have been suggested, not how the *use* of it *must* have become universal. The hypotheses which derive pointed arches from the intersections of branches of trees—or from the pointed form of doorways made by two stones leaning against each other—and even the very favourite opinion which supposes such arches to have originated with the intersecting round-headed arcades of the earlier architecture, must be considered as without value on this account. It is true, that, in these ways pointed arches would occur; and so they would in many others; for instance, as has been observed, in proving the first Proposition of Euclid. But this *possible* construction of the pointed arch affords us no key to its adoption—does not explain to us why it grew into use, *rapidly* as to time; *universally*, as to its application in all members of the building; and *exclusively* as to the final rejection of the round arch previously employed, and of all the other forms, many of which would be as obviously suggested as this form of the pointed arch. Whereas, the theory which I am now to develop, pretends not only to shew how this arch *might* be invented; but that it, or something like it, *must* have been wanted, discovered and employed.

That the adoption of this arch led to the other changes which combined to form the Gothic, is not capable of being proved with the same cogency; but yet we shall, it is hoped, be able to trace a natural and almost necessary influence of this element upon the other parts of the building, which seems to explain better than any other hypothesis the formation of the new style.

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It will appear, I think, from what has already been said, that the vaulting of a space of which the length and breadth were different, could only be effected by abandoning the semi-circular arch. The forms which the vaulting assumed when this arch ceased to be exclusively employed, were various. They were, moreover, variously affected by the distribution of the other parts of the building, and I shall consider the consequence and progress of this combination of causes.

SECT. 3. *Of the Aisled Form of Churches.*

A circumstance in the arrangement of Christian Churches which very remarkably influenced the subordinate parts, was their distribution into a center aisle and two side aisles. Some may perhaps be disposed to trace this construction to a remoter origin. Something resembling it is indeed found in the religious edifices of very distant times and countries. The Egyptian temples of Ybsambul and Hermontis are separated by two rows of piers or pillars into three alleys. The division of the central from the lateral spaces by longitudinal rows of pillars, is found also in the Opisthodomos of the Parthenon at Athens, and seems to have been general in the hypæthral temples of the ancients, as for instance in that at Pæstum. In this very ancient temple, indeed, we have another remarkable approximation to the arrangement of a Christian Church, for we find over each of these inner rows another range of smaller pillars, exhibiting a striking resemblance to a clerestory.