

# The medieval earthquakes of the Armenian Plateau and the historic towns of Ayrarat and Shirak (Dvin, Ani, Erevan)

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## Abstract

The ancient Armenian capitals have been struck by particularly violent earthquakes throughout the ages. Their prestigious and original monuments have been destroyed and reconstructed many times. The author examines in particular the situation of the monumental complex of Dvin, which has been subjected to a thorough and extensive campaign of archaeological excavations over the last twenty years or so, and that of Garni, struck by a violent earthquake in the 17th century. It was during this quake that the ancient temple of Garni was ruined; it was completely reconstructed in the present century. The author notes that some architectural techniques adopted in Armenian churches may be interpreted as antiseismic measures. They were developed in an environment in which the frequent experience of seismic damage could have offered numerous empirical observations on which they could be based.

**Key words** *Armenia – historical seismology – ancient architecture*

The territory of historic Armenia coincides with that of the Armenian Plateau and forms part of the Eurasian seismic zone. It is characterized by some areas marked by violent seismic activity, of which the main ones are those of Erzincan, Ararat, Shirak and Siwnik. In the history of the Armenian people the area of Ararat plays a particular role, because it is precisely in this region that most of the ancient Armenian capitals were situated: Armavir, Ervandashat, Artashat, Vagharshapat, Dvin, Erevan. The capital of the Kingdom of Bagratid, Ani, is situated, by contrast, in the area of Shirak.

The Armenian historians of the Middle Ages, as also the colophons of medieval manuscripts, provide historical evidence of the earthquakes on the Armenian Plateau and, in

particular, those in the Ararat region. They often describe in detail the damage caused by earthquakes, and this in turn also permits the intensity of the effects to be established. The earthquakes of the Ararat region are mentioned in the Armenian and foreign sources several centuries before the Christian era. Among the earthquakes of the Ararat region we should recall, in particular, those of the 9th century which more than once destroyed Dvin, ancient capital of medieval Armenia. Dvin was founded between 332 and 338 A.D. by King Chosroes III, who transferred his capital of Artashat there. From the 6th to the 9th century Dvin was both the capital of Armenia and its religious centre. In the 9th century it was destroyed by several earthquakes. It was then reconstructed and enjoyed a new period of growth and development from the 10th to the 12th century. But in 1236 the town was destroyed for good by the Mongol invasion.

Dvin was rediscovered in the course of archaeological excavations which are still continuing today: it was thus possible to observe that in the Early Middle Ages Dvin consisted of a citadel surrounded by walls and by outer suburbs. The citadel was built on a hill 30 m high, whose perimeter is approximately trapezoidal in shape. It is surrounded by extremely thick walls built of sun-baked bricks on stone foundations and fortified by round towers. In 1962 the excavations revealed on the summit of the citadel the foundations of a throne room datable to the 6th century: it was in the form of a basilica with four pairs of wooden columns on stone bases. To the south-west of the citadel lay the (patriarchal?) quarter, surrounded by a circuit of walls, and comprising the religious centre with its cathedral, its single-nave martyrium, and its patriarchal palace. The cathedral dedicated to St. Gregory the Illuminator was erected in three stages. According to the archaeological evidence, it was founded in the 6th century as a basilica with a nave and two aisles, divided by seven pairs of pillars. Cruciform in plan, with a polygonal apse on the outside, it was built of white clay with wooden beams and tile roof. In the 5th century, rectangular rooms were added to either side of the apse, and the building was surrounded on its southern and northern sides by a columnar gallery.

This cathedral is the largest church of medieval Armenia (its length excluding the gallery is 52.3 m) and remained standing until 572, when the Persians destroyed it to punish an Armenian uprising. Between 608 and 628 prince Smbat Bagratid, governor of Armenia, had it entirely reconstructed with ashlar blocks of tufa, and gave it the form of a domed basilica supported by four pillars; he added pentagonal apses on the outside on the north and south sides. To the north-east of the cathedral is the martyrium of St. Hizbouzit. This is a single-nave basilica built in 557, and distinguished by the exceptional thickness of its walls (c. 2 m). To the south-west of the cathedral is the patriarchal palace, built in the 5th century and burnt down in the 6th; it consists of a single hall, with three rows of columns, and a raised podium at its eastern end for the

throne of the Catholic Patriarch; it is flanked by two smaller rooms. To the north-east of the cathedral the excavations have revealed a second palatial complex, built in the 7th century. Compact, almost square, in plan, it has as its centre a ceremonial room supported by four columns, and five adjacent rooms, to the north and south. The tufa bases of the columns and their enormous capitals some 2 m broad and 1 m high, an Armenian variant of the Ionic order with palmette-decorated volutes, have been preserved. In the second half of the 9th century, Dvin was destroyed by earthquakes no less than five times in the space of less than 50 years. The first, that of 851, caused, according to the historian Mkhitar Airiwanétsi (1860), «the death of 12000 people in a single night» (IV, p. 55). Seven years later, in 858, according to Hovhannes Drasxanakertsi (1912), a Catholic historian, «a terrible earthquake took place at Dvin; numerous houses and several palaces were destroyed [...] and a horrible thunderous rumble filled the whole town. At the same time, the number of human victims was high and the danger was such that no one dared to remain below a roof, the population bewailed its fate in the streets and the squares, while the cold and the winter made the disaster still more terrible, because many died of the cold» (Drasxanakertsi, 1912, pp. 133-134). Only five years later, in 863, according to the historian Asofik (1885), «Dvin was shaken by a powerful earthquake which caused numerous victims and destroyed some fine buildings; the quake lasted three months» (Asofik, 1885, p. 168). The following earthquake, according to the historian Movsēs Kalankatvac'i (1912), took place six years later: «in 869 an earthquake of unusual power took place in the Armenian city of Dvin, and the shocks were repeated for a whole year, killing 12000 people» (Kalankatvac'i, 1912, p. 380).

However, these four quakes were only a kind of prelude to the disastrous quake of 893, which totally destroyed Dvin, and as a result of which this town ceased being the administrative and religious capital; its reconstruction took almost two centuries. The historian Thovma Arcruni (1917), an eye witness of the disaster, reports that the number of victims was

70000 (during this period the population of Dvin was of the order of 100000 inhabitants) and than this earthquake was more violent than that of 858 (Stepanyan, 1964, p. 372). As for Hovhannes Drasxanakertsi (1912), he too describes the destruction of the buildings of Dvin: «during the night an earthquake suddenly shook the city of Dvin; it caused enormous damage, infernal noise, horror and destruction in the densely populated town which was wholly destroyed: for the fortifications of its walls, the palaces of its princes and the houses of its inhabitants were seen to collapse. Everything was transformed into a desert in the twinkling of an eye. In the same way the divinely beautiful church of the patriarchal palace and many other solidly-built martyria collapsed and were reduced to rubble, turning their sites into a kind of wilderness of stone, the sight of which filled those who witnessed them with terror» (I, p. 162).

The quake destroyed all the monumental buildings of the citadel and of the patriarchal quarter. In the 10th century new buildings in brick were erected over the ruins of the citadel, but those of the patriarchal quarter (the cathedral, the martyrion and the palace) were not reconstructed. According to experts, the effects of the earthquake of 893 in Dvin must have been not less than grade IX on the MM scale.

The earthquakes of the 12th and 13th century in the Shirak area caused the destruction of another capital of medieval Armenia, the city of Ani, which remained deserted and abandoned after the 14th century. According to Orbeli (1911): «the last blow to the town was inflicted by the invasion of Tamerlane, but evidently even more disastrous was the emigration of the inhabitants of Ani, terrorized by the incessant incursions of successive earthquakes» (Orbeli, 1911, p. 28).

The earthquake of 1132 destroyed the church of the Holy Saviour in Ani, while that of 1139 caused terrible damage (Stepanyan, 1964, pp. 56, 63). The earthquake of 1988 in Spitak (which it would be more correct to call «a major earthquake in Armenia») also struck the monuments of Ani, destroying a corner of the cathedral.

The city of Erevan, situated in the centre of the Ararat region, which was the centre, and then the capital, of Armenia from the 15th century, was also devastated by numerous earthquakes in the course of its long history, extending over 28 centuries. But the most powerful and disastrous earthquake occurred in the 17th century and destroyed most of the city, almost all its churches, its fortress and its houses. The epicentre of the quake was located in the gorge of Garni, and it was propagated as far as the flanks of Mount Aragatz, destroying Erevan and the localities in its environs. The quake caused enormous damage to the monuments of the region. It destroyed the 1st century temple of Garni, a Roman-style peripteros which had stood for 17 centuries (it has now been entirely reconstructed using its original stones) and the 11th century monastery of Havutz Thar. As for the rupestrian monastery of Geghard (Ayri-vank), it was almost completely obliterated under the blocks of stone dislodged from the mountain-side. The historian Zakaria Sarkavag (1870), a monk of Hohvannavank and an eye witness of the disaster, writes: «on the 4 June 1679 the wrath of God fell on the land of Ararat [...] at 7 o'clock in the morning the sky suddenly began to thunder, as if it were a hurricane, then a terrible shock made the land tremble. The whole land of Ararat trembled and moved [...]. This earthquake came from one side of Garni and destroyed all the buildings, the fine houses, the churches and the monasteries. The churches destroyed are: Aghdjoutz, Ayrivank (Geghard), Havoutz Thar, Trdatakert (Garni), Khor-Virap, Djrvej, Dzagavank, three churches of Erevan, Noragavit, Noraguegh, Dzoraghegh, Nork, Gamrez. The fortress of Erevan collapsed, as did the mosque and the minarets. In many places the fountains continued to spurt, while others dried up. The riverbanks collapsed and filled the beds of the streams, impeding the flow of the water. Numerous villages were destroyed and at Kanaker not so much as a chicken-coop was left intact. But the most bizarre thing was that at Kanaker the four walls of a house collapsed, while its roof was left standing, over four columns, as if suspended in the air. The earthquake struck the town of Karbi [...]. All the beautiful buildings

of the hermitage of S. Hovhannavank collapsed, the church is leaning and only with great exertion did we manage to save ourselves. Though I do not know the total number of victims, 1228 dead were counted in my home village of Kanaker. The quake lasted until October. Each day the sky thundered three or four or five times and the land trembled. But all the damage had already been caused by the first shock» (Sarkavag, 1870, vol. 2, pp. 104-105).

The fact that the walls of a house collapsed while its roof was left standing, supported on columns, would seem to show that the shock of the quake had a mainly horizontal thrust (Stepanyan, 1964, p. 84). According to Zakaria Agulec'i (1870), another eye witness, the number of victims was 7600 at Erevan; the after-shocks continued until the following year, while the work of reconstruction began a month later and continued until the winter, until the «first snow» (Agulec'i, 1870, p. 143). The fortress was the first building to be restored, followed by the bridge of Hradzan and the town's drainage system. With the permission of the Shah of Persia, the reconstruction of the churches was also begun. The churches of Erevan, however, were totally destroyed. They were not restored; instead new churches, built on a different plan, were erected on their sites (Saints Pogos-Pétros, Zorovar). Of the medieval churches only the 13th-century, centrally-domed Cathedral of the Holy Mother of God was spared, thanks to a portico added on its west side in 1652 which was destroyed.

The aforementioned earthquakes on the Armenian Plateau constitute a kind of «trial»

for the architectonic structure of the monuments and their various plans. The experience over the centuries shows that oblong buildings on isolated supports have poor resistance to seismic shocks. From the Middle Ages onwards Armenian architects thus developed planimetric and compact spatio-volumetric, almost symmetrical, structures, thanks to which the monumental buildings were able to resist natural disasters through the centuries and to survive down to our own day.

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