

(editor's note: This paper was transcribed from a handwritten cursive copy with various difficulties. For a perfect rendition, the reader might wish to consult the original, itself a copy, in the volume entitled *Literary Club Papers I*, 1885 – 1886 Oct 3, '85 to May 29, '86) The original is very badly faded.

Why Does the Tower of Pisa Lean

In the very early years the subject of the leaning tower of Pisa had excited a deep interest in my youthful mind. I believe this interest was caused by a picture I had seen, and the unsatisfactory answers to all the questions as to the reasons for the leaning. Was it built that way intentionally, or did it move from the perpendicular from natural causes after it was finished? My seniors, whom I catechized, gave me to understand that it was a deep mystery which would probably never be solved.

Years slipped by. The activities of the mature life succeeded those of childhood, and I ceased entirely to trouble my head about this Pisan tower.

Traveling in Italy a short time since, being on the way from Genoa to Rome, and observing on the map that Pisa lay on my route, boyish recollections concerning the mysterious tower awoke from a Rip van Winkle sleep. I determined to stop over, and on the spot to solve my ancient problem. It was not impossible that I might find some book upon the subject in our public libraries on my return home, that would give full information on the subject; but here was the tower itself, and it was at least worth a visit.

So, strolling from my hotel near the railway station towards the northwest corner of the very quiet town, along a dusty white road leading across the Arno by a fine marble bridge, I at last stood in the open square where are clustered a group of imposing buildings which, taken collectively, has few equals in the world. Naturally the tower was the first to engross attention. I examined it inside and out; ascended the spiral stairway in the massive wall, and began to think that the enigma concerning the cause of the inclination was unsolvable.

It may be unnecessary to mention that the tower is simply the belfry of the cathedral, which, according to a common Italian custom is entirely detached from it, – a completely separate structure. It is massively built of white marble, discolored by time, but originally pure white, as indicated by the chips cut from the ancient stone, by the masons making repairs at the summit at the time of my visit. Its height is 188 feet, diameter of about fifty, and an inclination of 13 feet from the perpendicular. It has a solid, weighty

appearance, as if built to last for all time. Although graceful in design, it is not high enough, compared with its diameter, for perfect symmetry. In fact, if it stood erect, it would look uncompleted.

Unsatisfied, I left the tower, to view the other remarkable edifices of the vicinity. While examining the exterior of the great cathedral, I obtained the key to explain the riddle. This building is a basilica of well cut, heavy blocks of marble. At one corner, the bedding of the courses of stone was not horizontal, as in the rest of the building. There had evidently been a settlement in the foundation which had dragged down a corner for a depth of 12 or 18 inches, at the greatest depression, and gradually tapering to nothing at some distance on each side. All these inclined courses had been neatly pointed, and a beveled course added under the cornice to restore it to a level.

Here certainly was an indication of the compressible soil which had acted, under the weight of the grand church founded in the 11th century, just as the soils of Holland and our own New Orleans do with the buildings of the present day. I returned to the campanile and looked at the ponderous masonry tilted in a manner unprecedented in all rules of construction, ancient or modern. I find no wedged courses of masonry to level it, but I do find that above a certain height the architect had endeavored to partially overcome the effects of obliquity by shortening the exterior columns on one side, and lengthening them on the other. On the spot I read a short sketch of its history. Begun by Bonannus of Pisa, and William of Innsbruck, finished by Thomas Pisano. Founded in 1174, and finished in 1350, – 176 years in building; –a circumstance in itself not very remarkable, as the construction of many of the cathedrals of Europe occupied centuries; but considered in connection with the facts previously mentioned, I drew my conclusions.

The first architects began the erection with the intention of carrying the tower to a height of about 300 feet. When it had reached a considerable elevation, the weight was too great for the limited area of the foundation on the uncertain soil, and it slowly sprung from the perpendicular. The building was abandoned to wait time for the forthcoming of fresh funds for an entire re-erection. For a long period the unfinished tower stood untouched. The inclination did not increase neither was the solidity of the mass impaired by cracks. Time had hardened the mortar to stone, so that marble and cement had united to form a monolith.

The idea even occurred to the new architect to finish the tower; if not to the

originally intended height, at least to an elevation consistent with the laws of gravity. He could shorten and lengthen columns to help the matter somewhat. It would be a curiosity. It would bring fame to the architect; it would “fill a long felt want” of the church-people in giving them a coveted bell-tower without which the cathedral was incomplete.

My conclusion therefore, was that the compressible alluvial soil under the foundation, was the primary cause of the leaning of the Tower of Pisa.

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