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The Origin of the Skyscraper



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Gerard Peet is a lecturer at the Rotterdam University of Applied Sciences, faculty of Urban and Regional Planning. Gerard has been researching the history of the skyscraper for many years. Gerard lectures on this subject at the Hogeschool Rotterdam and is also working on a book about this with the working title "Non-American – A Complementary History of Skyscrapers." Another of Gerard's special fields of interest is the development of skyscrapers designed as neighborhoods rather than as separate buildings, and the social sustainability of tall buildings.

Gerard graduated from the Delft University of Technology, in the Netherlands, as a civil engineer and was a member of the city council of Rotterdam, for eight years. As such, he was a member of the Committee of Urban Planning and Housing. Gerard Peet has published and is preparing other books addressing architectural and/or planning history.

“An alternative to using technical criteria to define skyscrapers would be to look at the way the first tall buildings were perceived by analyzing the characteristics that inspired the press and public to coin a word for this new phenomenon.”

The modern skyscraper is generally considered to be an American invention. Both Chicago and New York claim they once hosted the world's first skyscraper, and even though the tallest buildings are now being built outside the United States, many American companies are involved in the architectural and structural design of today's world's tallest buildings. In this paper, a new definition of the skyscraper is introduced based on the first appearances of the word in the public press. Consequently it looks beyond the point in time during which the word was coined in the United States to see which buildings were the first in the world to be considered skyscrapers.

Birth of the American Skyscraper

According to most skyscraper books, the world's first skyscraper was the Home Insurance Building in Chicago, which was completed in 1885. Some publications however, have presented different views. New York journalist and architecture critic Montgomery Schuyler was one of the first to do so. In an article titled "The Evolution of the Skyscraper" (published in 1909) he proposed several candidates for the title of the first skyscraper:

- The Equitable Life Assurance Building in New York (completed in 1870): this was the first office building where the elevator was used to comfortably gain access to higher floors and as such allowed the building to be taller than usual.
- The Tribune Building and the Western Union Building in New York (both completed in 1875): these were the first buildings to use elevators and the first to show the number of stories of the building on the exterior. The Equitable Life Assurance Building, for example, contained seven stories but in its external design showed no more than four.

- The Home Insurance Building in Chicago (completed in 1885): this was the first building to have a core of metal embedded in the masonry (see Figure 1).

In 1929, the Peruvian born architect, Francisco Mujica, published his book called "The History of the Skyscraper." In this book, he identified three different typologies for the first skyscrapers:

- Pre-skyscrapers: tall masonry buildings that have passenger elevators.
- Embryo Skyscrapers: tall buildings with elevators and a metal frame.
- Modern Skyscrapers: buildings of great height constructed on a steel skeleton that have high-speed electric lifts.

Mujica determined that Chicago's Home Insurance Building had been the first Embryo Skyscraper and that Chicago's Rand McNally Building (completed in 1890) had been the first all-steel frame skyscraper built in the world.

Schuyler and Mujica were among the first to discuss which building deserved the title of the world's first skyscraper. It can be reasoned that the arguments used at the time are still echoed in more recent publications, such as Winston Weisman's article "New York and the Problem of the First Skyscraper" (1953), Gerald R. Larson's "The Iron Skeleton Frame:

...attention

“Governments are encouraging these iconic buildings in order to give a very clear message to the outside world: Please pay attention to our city.”

Dennis Poon, Thornton Tomasetti, on Shanghai Tower, China. From "New Skyscrapers Pop-up across China," www.kansascity.com, Dec 5, 2010.

Interactions Between Europe and the United States,” and the book “Rise of the New York Skyscraper, 1865–1913” by Sarah Bradford Landau and Carl W. Condit, to name a few.

In these publications, the answer to the question of which building deserves the honor of being the world’s first skyscraper is determined by different definitions, which consequently leads to different results. If the use of elevators is the only criterion, New York’s Equitable Life Assurance Building would be the first. If the use of a metal construction is a criterion, then Chicago’s Home Insurance Building should be considered the first. If the use of an all-steel frame is the determining factor, Chicago’s Rand McNally Building would be the first. But other deciding factors could be taken into account as well, such as a determined minimum height, shape, and slenderness of a building, in which case, these new criteria would therefore produce other candidates for the world’s first skyscraper.

The World’s First Skyscrapers – A Different Approach

An alternative to using technical criteria to define skyscrapers would be to look at the way the first tall buildings were perceived by analyzing the characteristics that inspired the press and public to coin a word for this new phenomenon.

The word “skyscraper” has a long history of defining people and things that are exceptionally tall. No one knows exactly when people started to use this terminology for the tall buildings that started to appear in American cities in the 1870s, but according to the second edition of the Oxford English Dictionary, the word skyscraper got its architectural denotation (in print) in the early 1880s in a number of articles in newspapers and journals.

The Chicago Daily was one of those newspapers. On February 25, 1883, its regular feature, New York Gossip, contained an article about architecture in New York titled “The

High-building Craze.” The subtitle was: “Our Skyscrapers” and its first sentence read: “There are more very high buildings in New York than in all the rest of the country put together.”

It did not take long before similar articles showed up. Shortly after it had been completed in 1882, Chicago’s Montauk Block was given the honor of being called a skyscraper. On August 2, 1884, the Chicago based Real Estate and Building Journal reported, “veritable skyscrapers have been springing up here during the past couple of years almost with mushroom rapidity.” Most of these buildings were mentioned by name (see Figure 2). Some 20 or 30 eight-story flats in New York were left anonymous but also considered to be skyscrapers.

Characteristics of the First Skyscrapers

These buildings called skyscrapers had a couple of characteristics in common. The first important characteristic was their height. With at least six or seven stories and a minimum



Figure 1. Home Insurance Building in Chicago (44 m/144 ft), 1885

New York			
Equitable Life Assurance Building	1870 †	43 m/141 ft	8 stories
Western Union Building	1875 †	70 m/230 ft	10 stories
Tribune Building	1875 †	79 m/259 ft	10 stories
Boreel Building	1879 †	-	8 stories
Mills Building	1883 †	-	9 stories
Temple Court	1883 †	45 m/148 ft	10 stories

Chicago			
Montauk Block	1882 †	39 m/128 ft	10 stories
Calumet Block	1883 †	44 m/144 ft	-
Royal Insurance Building	1884 †	-	9 stories
Counselman Building	1884 †	44 m/144 ft	9 stories
Pullman Building	1884 †	49 m/161 ft	10 stories
Home Fire Insurance Building*	-	44 m/144 ft	10 stories
Marshall Field Building*	-	51 m/167 ft	-
Northwestern Loan and Trust Company Building*	-	48 m/157 ft	-

† demolished

* these buildings were not completed at the time these articles were published, the Home Fire Insurance Building is better known as the Home Insurance Building

Figure 2. Skyscrapers explicitly mentioned in the Chicago Daily (Feb 25, 1883) and the Real Estate & Building Journal (Aug 2, 1884)



Figure 3. Brussels City Hall, 1420 © Alina Zienowicz

height of around 35 meters (115 feet), the early skyscrapers were about twice the normal height of typical buildings at the time. The second characteristic of the first skyscrapers is that these tall buildings were all built to provide space in which people could either work (offices) or live (residential buildings and hotels). Most of them were office buildings, with the exception of the Marshall Field Building, which was a department store, and the eight-story flats, which were residential buildings.

Technology was not regarded as an issue in these articles. As a result, the use of elevators in buildings was not part of the discussion. Among the buildings listed were masonry structured buildings as well as buildings using metal construction. Slender, tower-shaped buildings were considered skyscrapers in addition to wide and tall buildings. As an example, The Chicago Marshall Field Building's length surpassed its height and was considered to be a skyscraper, demonstrating that the shape of the building was not part of the dialogue for defining a skyscraper.

Both New York and Chicago also counted many multi-story warehouses with a height comparable to the first skyscrapers. As these were built to store goods and not to accommodate people, they were not

included in the skyscraper lists of the 1880s. Neither were church spires nor clock towers, as even though these towers were tall, the height of these structures did not contain space to accommodate people. Hence, warehouses, church spires, and clock towers were not considered to be skyscrapers at that time.

It is reasonable to assume that the word skyscraper was referring to buildings because of their height and not because they had specific technical features such as elevators or steel frames. These technical characteristics were not visible to the observer; their height was sufficient enough to inspire the observer(s) to create a new word for these buildings.

Based on the above, a definition for skyscrapers based on perception can be pretty straightforward: *A skyscraper is a multi-story building which is built to accommodate people and has a minimum height of 35 meters (115 feet).* This is, however, a definition that is only valid for the late 19th and 20th century. As skyscrapers got taller, the minimum height necessary to awe the observer into using the word skyscraper increased. Consequently, this simple definition needs to be revised accordingly because each period in time requires a different minimum height.

The World's First Skyscrapers – New Candidates

Having established a definition of the skyscraper based on the perception at the time, one has to wonder whether the American skyscrapers of the 1870s and 1880s were the first buildings in the world to fit within that definition, and if these buildings really were the world's first skyscrapers. History

shows that they were not, as several buildings in Europe and Asia preceded them.

Rome's Insulae Felicula

Some 25 years BC, the Roman architect Vitruvius explained why apartment buildings in Rome needed to be tall: "Yet with this greatness of the city and the unlimited crowding of citizens, it is necessary to provide very numerous dwellings. Therefore, since a level site could not receive such a multitude to dwell in the city, circumstances themselves have compelled the resort to raising the height of buildings. And so by means of stone pillars, walls of burnt brick, party walls of rubble, towers have been raised, and these being joined together by frequent board floors produce upper stories with fine views over the city to the utmost advantage. Therefore walls are raised to a great height through various stories." Ancient Rome's tall apartment buildings, called "insulae," were considered dangerous. There was a great risk of fatal fires and construction was often so poor that such buildings collapsed. It forced two Roman emperors to establish limitations to the height of buildings, height limits which were not always enforced.

Possibly the tallest among Rome's insulae was the Insulae Felicula. It must have been a special building as it was the only insulae mentioned by name out of thousands of



Figure 4. Vienna City Hall, 1883 © Gryffindor



Figure 5. City Chambers, formerly the Royal Exchange (36 m /118 ft) in Edinburgh, 1753

nameless insulae in a fourth century guidebook to Rome. An earlier book, written by Tertullian in the 3rd century, suggests that Insulae Felicula had 12 stories, a height that would most definitely make it a skyscraper. Unfortunately, there is no confirmation that these speculations are true because the building no longer exists and no archaeological evidence has been found of this building.

Symbols of power and religion: Sana'a, Brussels and Lhasa

Throughout history, temples, palaces and churches have been built with height being one of the main features to impress people. In most cases the necessary height was created by means of spires, towers, or domes. In some cases, however, height involved many stories that could be used to accommodate people.

The Ghamdan Palace in Sana'a, Yemen was built in the 3rd century. It may have been an example where height was used to both impress and accommodate people. The Arab historian, Al Hamdani, wrote about this palace around the year 900 and described it as having 20 stories and being "some 90 meters tall." Sadly, the palace was destroyed in the 6th or 7th century, which leaves Al Hamdani's writings as the only means of verifying the Ghamdan Palace's true height.

In the 15th century, the City Hall of Brussels (see Figure 3) was built to be a symbol of

secular power, gaining pre-eminence over the nobility and the church. Its tower is 97 meters (318 feet) tall. The height of the building, excluding the tower, is still around 37 meters (121 feet), which is enough to comply with the definition of a skyscraper. It would be Europe's only city hall to fit our definition until 1883 when Vienna built a new city hall with similar heights: 105 meters (344 feet) for the tower portion and approximately 50 meters (164 feet) for the occupiable part of the building (see Figure 4).

The Potala in Lhasa (Tibet, China) is a complex of palaces, temples and other buildings. Until 1950, the Potala was the center of Tibetan government. From 1950 until 1959, it was the residence of the Dalai Lama. At its highest point, the palace had thirteen floors with a height of 117 meters (384 feet). As it was built against the slopes of a hill, its height above the ground is much lower at the higher side of the hill, thus making it a dubious contender for a skyscraper.

Edinburgh

In the 16th century, the Scottish city of Edinburgh was faced with a growing population within the compact framework of the walled city. As was the case during Roman times, Edinburgh was forced to look at height as a solution to house the growing number of inhabitants. The first half of the 17th century saw the construction of houses with six or seven floors. As Edinburgh is situated on a hill,

sometimes houses had to be built on sloping ground, in which case they could only have a limited number of floors at the front of the building and a large number of floors at the back.

In 1693, Robert Sibbald gave a description of such a house: "Here is one of the highest houses in the world, mounting seven stories above the Parliament Court, and being built upon a great descent of the hill, the back part of it is as far below it, so that from the bottom to the top, one stair-case ascends 14 stories high." In summary: seven stories at the front, fourteen at the back. Some sixty years later, in 1753, construction begun on the Royal Exchange. At the front, it had four stories and at the back it had twelve, giving it a backside height of about 36 meters (118 feet). It was a multi-functional building with residential units as well as commercial space for businesses, shops and coffee houses.

The Royal Exchange was probably one of the last skyscrapers to be built in Edinburgh in that time period (see Figure 5). Not long after its completion, plans were made for a new town outside the city walls and people started to leave the Old Town to these new houses. The need to build tall diminished because of this sprawl, thus making the Edinburgh skyscrapers a dead-end in the evolution of the skyscraper. Most of the Edinburgh skyscrapers were lost to fire or neglect. The Royal Exchange, now called City Chambers, is the only one still standing today. ☞

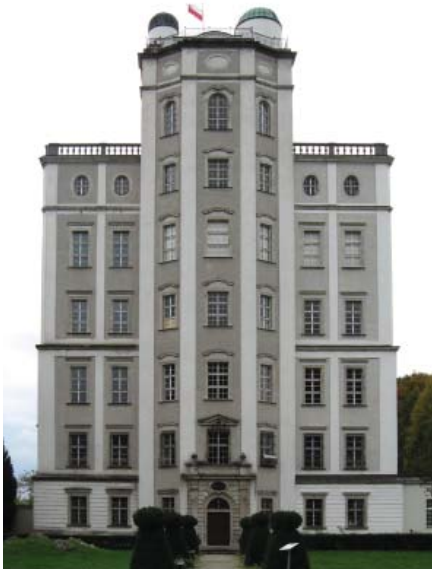


Figure 6. Mathematische Turm, Kremsmünster, 1758

Kremsmünster

During the course of the 18th century, the Age of Enlightenment slowly started to exert its influence within the Roman Catholic Church. The Benedictine monastery in Kremsmünster was one of the first places to allow scientific research as a major activity within its walls. During 1749 to 1758, the monastery built an observatory called the Mathematische Turm (see Figure 6). Anselm Desing was both its driving force as well as the (untrained) architect, and he wanted it to be a workshop of the noble sciences. Since astronomy was the main objective of the new building,

Desing designed a 49-meter (161-foot) tall tower, which benefited greatly from having the observatory located at the top. In addition, the tower also served as the needle of a giant sun-clock laid out in the monastery's gardens.

In the time it was built, there was little experience with the construction of a tall building and stone walls of that height. As a result, part of the unfinished tower collapsed in 1755. Construction was resumed, however, and the tower was completed in 1758 and was in operation a few years later. In 1856, two domes were placed on top of the tower without changing its overall height. By the 19th century, a museum for natural sciences was opened in the tower.

Shibam

"None of the cities [in Yemen] make such an outspoken impression of a skyscraper city as the great city of Shibam." The German explorer Hans Helfritz was clearly impressed when he visited Shibam around 1930. He was one of the first westerners allowed to travel to the interior of what is now Yemen and he was the first one to write a book about it: "Chicago der Wüste" (Chicago of the Desert, 1932). It was a tribute to Shibam: "One sees from a distance of many miles how this marvelous skyscraper city with its twelve storied houses rises from the plain." It reminded him of the skyscrapers of Chicago, hence the title of his book. However, the height of the houses is not the only reason for that: "Shibam has to

defend itself regularly against attacks from gangs of robbers, ... in that too it resembles the American city of Chicago." Regarding the United States, Helfritz had one more remark to make, "Shibam's high-houses had been built at a time when America only knew miserable huts."

Shibam's history goes back to the 4th century BC. Shibam and its skyscrapers as described by Helfritz date back to the 16th century (see Figure 7a and 7b). Since then, Shibam has not grown in surface area. Its growth was to be found in height, as the expansion of the city would have been at the cost of fertile agricultural land around the city. Safety considerations furthered the necessity for Shibam to develop exclusively within its city walls.

London

The Midland Grand Hotel at London's St. Pancras Station was completed in 1976 and was presented as Europe's most modern hotel. Part of the hotel was a 76-meter (249-foot) tall tower above one of the entrance gates to the station. The tower had eight or nine floors and the rest of the hotel had six. Ascending chambers (hydraulic lifts) were available to guests to reach the upper floors. By this time, Londoners were used to buildings with tall towers such as the Houses of Parliament. Therefore, the Midland Grand Hotel was just another tower and there was no need to introduce a new word for this high, multi-story building (see Figure 8a & 8b).



Figure 7a. Shibam, photographed by Hans Helfritz during his travels. At least one of the houses in this picture has 12 floors © Hans Helfritz, Chicago der Wüste (1932)



Figure 7b. Shibam, Yemen (2005) © National Geographic

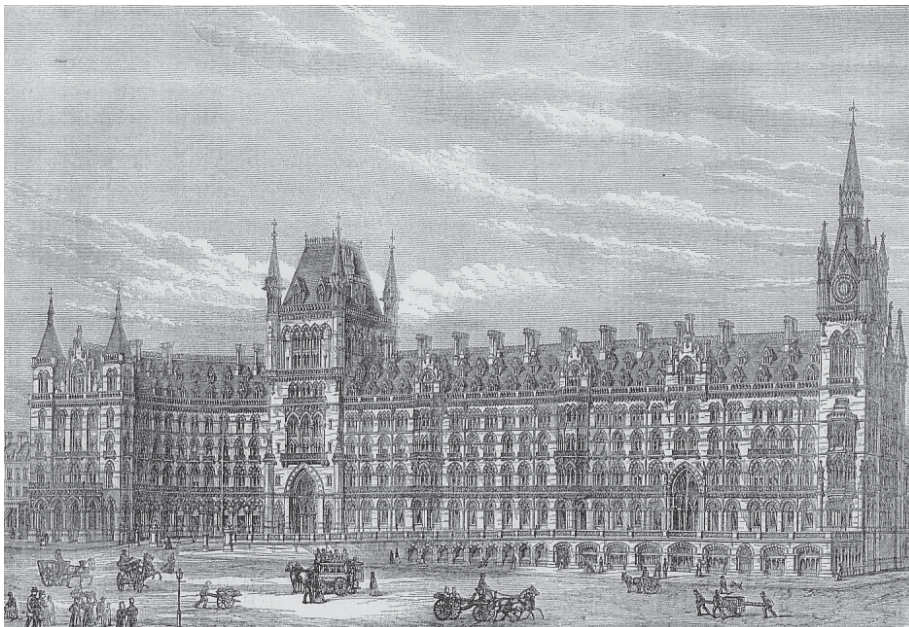


Figure 8a. The Midland Grand Hotel (76 m/249 ft), 1876. Part of St. Pancras Station in London. The clock tower at the right hand side of the building is 82 meters high. Drawing from the Illustrated London News, September 9, 1871



Figure 8b. St. Pancras Station, London. © English Heritage

The Midland Grand Hotel was built in the same period as New York's Tribune and Western Union buildings. Its inspiration, however, did not come from New York's skyscrapers but rather from Belgium's old City Halls. It was an independent start of England's skyscraper history, American influence would come later.

Skyscrapers "Avant La Lettre"

Not many people will regard the buildings presented in this article as skyscrapers. Some are not slender towers, which is an important characteristic of almost all modern skyscrapers. And most of these buildings are not tall by any of today's standards. However, this exercise was based on the tall buildings of the 1880s which caused a dedication to the word "skyscraper," and these buildings should therefore be the reference by which to judge buildings constructed prior to the moment the word was coined. All of the buildings discussed in this article were built before the term skyscraper was first extensively used. They definitely are skyscrapers by the standards of the 1880s and they are also the skyscrapers "avant la lettre." ■

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...integrated

“There is a movement in the design and construction industry called ‘integrated design,’ where architects, engineers, specialists, contractors and building operations staff are in on the design process from the outset. Tower designers have been designing this way for years; there is no other way.”

Dan Kaplan, *FXFOWLE*, about the process for designing a skyscraper. From "Times Square's Newest Skyscraper: An Interview with Dan Kaplan of FXFOWLE," *The Huffington Post*, December 9, 2010.