

Marble

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This article is about the rock. For the toy, see [Marble \(toy\)](#). For other uses, see [Marble \(disambiguation\)](#).



Marble in Carrara marble quarry, Italy



The [Taj Mahal](#) is entirely clad in marble.

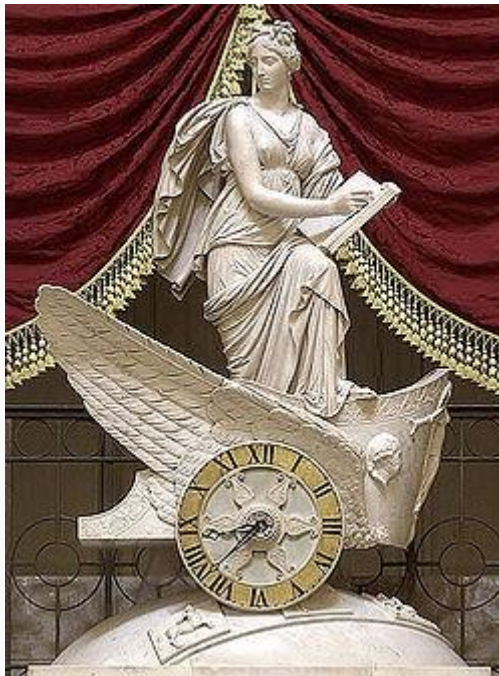
Marble is a [metamorphic rock](#) that may be foliated or non-foliated and composed of recrystallized carbonate minerals, most commonly [calcite](#) or [dolomite](#). Geologists use the term "marble" to refer to metamorphosed [limestone](#); however, stonemasons use the term more broadly to encompass unmetamorphosed limestone.^[1] Marble is commonly used for [sculpture](#) and as a [building](#) material.

Contents

[\[hide\]](#)

- [1Etymology](#)
- [2Physical origins](#)
- [3Types](#)
- [4Uses](#)
 - [4.1Sculpture](#)
 - [4.2Construction marble](#)
- [5Production](#)
 - [5.1Occupational safety](#)
 - [5.2United States](#)
- [6Microbial degradation](#)
- [7Cultural associations](#)
- [8Artificial marble](#)
- [9Gallery](#)
- [10See also](#)
- [11References](#)
- [12External links](#)

Etymology[\[edit\]](#)



Carlo Franzoni's sculptural marble [chariot clock](#) depicting [Clio](#), the Greek [muse](#) of history.



Marble wall of [Ruskeala](#), [Republic of Karelia](#), [Russia](#)

The word "marble" derives from the [Greek](#) [μάρμαρον](#) (*mármaron*),^[2] from [μάρμαρος](#) (*mármaros*), "crystalline rock, shining stone",^{[3][4]} perhaps from the verb [μαρμαίρω](#) (*marmairō*), "to flash, sparkle, gleam",^[5] [R. S. P. Beekes](#) has suggested that a "[Pre-Greek](#) origin is probable."^[6]



Folded and weathered marble at [General Carrera Lake](#), [Chile](#)

This stem is also the basis for the English word *marmoreal*, meaning "marble-like." While the English term resembles the [French](#) *marbre*, most other European languages follow the original Greek—see [Persian](#) and [Irish](#) *marmar*, [Spanish](#) *mármol*, [Italian](#) *marmo*, [Portuguese](#) *mármore*, [Welsh](#), [Slovene](#), [German](#), [Norwegian](#), [Danish](#) and [Swedish](#) *marmor*, [Romanian](#) *marmură*, [Polish](#) *marmur*, [Dutch](#) *marmer*, [Turkish](#) *mermer*, [Czech](#) *mramor*, and [Russian](#) *мрамор* (*mramor*). In [Hungarian](#) it is called *márvány*.

Physical origins^{[[edit](#)]}

Marble is a rock resulting from [metamorphism](#) of [sedimentary carbonate rocks](#), most commonly [limestone](#) or [dolomite rock](#). Metamorphism causes variable recrystallization of the original carbonate mineral grains. The resulting marble rock is typically composed of an interlocking mosaic of carbonate [crystals](#). Primary sedimentary textures and structures of the original carbonate rock ([protolith](#)) have typically been modified or destroyed.

Pure white marble is the result of metamorphism of a very pure ([silicate](#)-poor) limestone or dolomite protolith. The characteristic swirls and [veins](#) of many colored marble varieties are usually due to various mineral impurities such as [clay](#), [silt](#), [sand](#), [iron oxides](#), or [chert](#) which were originally present as grains or layers in the limestone. Green coloration is often due to [serpentine](#) resulting from originally high magnesium limestone or dolostone with silica impurities. These various impurities have been mobilized and recrystallized by the intense pressure and heat of the metamorphism.

Types^{[[edit](#)]}

Main article: [List of types of marble](#)

Examples of historically notable marble varieties and locations:

Marble	Color	Location	Country
Carrara marble	white or blue-gray	Carrara , Tuscany	 Italy
Connemara marble	green	Connemara , County Galway	 Ireland
Creole marble	white and blue/black	Pickens County, Georgia	 United States
Etowah marble	pink, salmon, rose	Pickens County, Georgia	 United States
Makrana marble	white	Makrana , Nagaur district , Rajasthan	 India
Murphy marble	white	Pickens and Gilmer Counties, Georgia	 United States
Nero Marquina marble	black	Markina , Spain	 Spain
Parian marble	pure-white, fine-grained	Island of Paros (Πάρος), South Aegean (Νοτίου Αιγαίου)	 Greece
Pentelic marble ^{[7]}	pure-white, fine-grained semitranslucent	Mount Pentelicus (Πεντελικό όρος), Attica (Αττική)	 Greece
Purbeck marble	Gray/brown	Isle of Purbeck , Dorset	 United Kingdom
Ruskeala marble	white	near Ruskeala (Рускеала), Karelia (Карелия)	 Russia
Rușchița marble ^{[8]}	white, pinkish, reddish	Poiana Ruscă Mountains , Caraș-Severin County	 Romania

Sienna marble ^[9]	yellow with violet, red, blue or white veins	near Siena, Tuscany	Italy
Bianco Sivec	white	near Prilep (Прилеп), Pelagonia (Пелагониски)	 Macedonia
Swedish green marble	green	near Kolmården, Södermanland	 Sweden
Sylacauga marble	white	Talladega County, Alabama	United States
Vermont marble	white	Proctor, Vermont	United States
Yule marble	uniform pure white	near Marble, Colorado	United States
Wunsiedel marble	white	Wunsiedel, Bavaria	 Germany

Uses^{[[edit](#)]}



Ritual [amphora](#) of veined marble from [Zakros](#). [New palace period](#) (1500-1450 BC), [Heraklion Archaeological Museum](#), [Crete](#).



Marble Products in [Romblon, Philippines](#).

Sculpture^{[[edit](#)]}

White marble has been prized for its use in [sculptures](#) since [classical times](#). This preference has to do with its softness, which made it easier to carve, relative [isotropy](#) and homogeneity, and a relative resistance to shattering. Also, the low [index of refraction](#) of calcite allows light to penetrate several millimeters into the stone before being scattered out, resulting in the characteristic waxy look which gives "life" to marble sculptures of any kind, which is why many sculptors preferred and still prefer marble for sculpting.

Construction marble^{[[edit](#)]}

Construction marble is a stone which is composed of calcite, dolomite or serpentine which is capable of taking a polish.^[10] More generally in [construction](#), specifically the [dimension stone](#) trade, the term "marble" is used for any crystalline calcitic rock (and some non-calcitic rocks) useful as building stone. For example, [Tennessee marble](#) is really a dense granular fossiliferous gray to pink to maroon [Ordovician](#) limestone that [geologists](#) call the [Holston Formation](#).

[Ashgabat](#), the capital city of [Turkmenistan](#), was recorded in the 2013 [Guinness Book of Records](#) as having the world's highest concentration of white marble buildings.^[11]

Production^[edit]

According to the [United States Geological Survey](#), U.S. domestic marble production in 2006 was 46,400 tons valued at \$18.1 million, compared to 72,300 tons valued at \$18.9 million in 2005. Crushed marble production (for aggregate and industrial uses) in 2006 was 11.8 million tons valued at \$116 million, of which 6.5 million tons was finely ground [calcium carbonate](#) and the rest was [construction aggregate](#). For comparison, 2005 crushed marble production was 7.76 million tons valued at \$58.7 million, of which 4.8 million tons was finely ground calcium carbonate and the rest was construction aggregate. U.S. dimension marble demand is about 1.3 million tons. The DSN World Demand for (finished) Marble Index has shown a growth of 12% annually for the 2000–2006 period, compared to 10.5% annually for the 2000–2005 period. The largest dimension marble application is tile.

Marble production is dominated by 4 countries that account for almost half of world production of marble and decorative stone. [Italy](#) is the world leader in marble production, with 20% share in global marble production followed by [China](#) with 16% of world production. [India](#) is third ranking with 10% of world production, followed by [Spain](#) in fourth ranking position with 6% of world production; all other countries, combined, account for the remaining half of world marble production.^[12]

Occupational safety^[edit]

Dust produced by cutting marble could cause lung disease but more research needs to be carried out on whether dust filters and other safety products reduce this risk.^[13]

United States^[edit]

The [Occupational Safety and Health Administration](#) (OSHA) has set the legal limit ([permissible exposure limit](#)) for marble exposure in the workplace as 15 mg/m³ total exposure and 5 mg/m³ respiratory exposure over an 8-hour workday. The [National Institute for Occupational Safety and Health](#) (NIOSH) has set a [recommended exposure limit](#) (REL) of 10 mg/m³ total exposure and 5 mg/m³ respiratory exposure over an 8-hour workday.^[14]

Microbial degradation^[edit]

The haloalkaliphilic methylotrophic bacterium [Methylophaga murata](#) was isolated from deteriorating marble in the [Kremlin](#).^[15] Bacterial and fungal degradation was detected in four samples of marble from Milan cathedral; black [Cladosporium](#) attacked dried acrylic resin^[16] using melanin.^[17]

Cultural associations^[edit]



[Jadwiga of Poland](#)'s sarcophagus by Antoni Madeyski, [Wawel Cathedral](#), [Cracow](#)



[Relief](#) on the Marble Door of the [Hagia Sophia](#) in [Istanbul](#)

As the favorite medium for Greek and Roman sculptors and architects (see [classical sculpture](#)), marble has become a cultural [symbol](#) of tradition and refined taste. Its extremely varied and colorful patterns make it a favorite decorative material, and it is often imitated in background patterns for [computer displays](#), etc.

Places named after the stone include [Marblehead, Massachusetts](#); [Marblehead, Ohio](#); [Marble Arch](#), London; the [Sea of Marmara](#); India's [Marble Rocks](#); and the towns of [Marble, Minnesota](#); [Marble, Colorado](#); [Marble Falls, Texas](#), and [Marble Hill, Manhattan, New York](#). The [Elgin Marbles](#) are marble sculptures from the [Parthenon](#) that are on display in the [British Museum](#). They were brought to Britain by the [Earl of Elgin](#).