

Geologic Site of the Month
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Meteorites in Maine: Is the sky falling???



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Introduction

At one time or another, almost everyone in Maine has glimpsed a swift little streak of light dashing across the night sky. These sudden celestial visitors are meteors, commonly called falling or shooting stars. Because they arrive at very high speeds - anywhere from 7 to 46 miles per second - they vaporize by air friction in a white-hot streak. Occasionally a larger object will survive its descent through the atmosphere and fall to Earth. At that point it is called a meteorite. So what about meteorites and have any ever landed in Maine??



What is a meteorite?

A meteorite is a chunk of metallic or stony material from space that strikes the surface of the Earth. These rocks originated in the asteroid belt, on the Moon, and from other planets. Rocks blasted off any such parent bodies, by impact or collision, will orbit the Sun just as the planets do. A small fraction of these orbiting rocks cross the Earth's orbit, and coming under the influence of Earth's gravity, may fall into our atmosphere. If they survive this fiery descent to Earth, they become meteorites.

There are three kinds of meteorites: stony, iron, and stony-iron. Stony meteorites consist of minerals rich in silicon and oxygen, with smaller amounts of iron, magnesium, and other elements. One group of stony meteorites, called chondrites, are pieces of the same material from which the planets formed. Another group of stony meteorites, the achondrites, were once part of a parent body, such as an asteroid, that was large enough to have melted and separated into an iron-rich core and a stony crust. Achondrites come from the outer crust; stony-iron meteorites, from the inner crust; and iron meteorites, from the metallic core. Iron meteorites consist mostly of iron and nickel.

The size of meteorites varies greatly. Most of them are relatively small. The largest meteorite ever found weighs about 60 metric tons. This meteorite, discovered in 1920, fell at Hoba West, a farm near Grootfontein, Namibia. However, much larger bodies, such as asteroids and comets, can also strike the earth and become meteorites. Meteorites reach the Earth's surface because they are the right size to travel through the atmosphere. If objects from space are too small, they will disintegrate in the atmosphere. If they are too large, they may explode before reaching Earth's surface. These are called bolides. One such bolide exploded 6 miles above the Tunguska River in Siberia in 1908, leaving a 20-mile area of devastation, consisting of felled and scorched trees.



Maine Meteorites

Though many meteorites probably have landed in Maine, only 5 have been found and authenticated and described in the scientific literature, and portions of each are preserved in museum collections. Four of these were actually observed falling from the sky, and were collected shortly thereafter. These types of meteorites are termed "falls" to distinguish them from meteorites found later than their impact, which are called "finds."

Meteorites are named for geographic features near the sites where they are found. So each of the 5 Maine meteorites has been given an appropriate name to distinguish its geographical site of discovery. The Maine meteorite falls and finds are listed and described below in chronological order of their discovery.



Nobleboro Meteorite

Maine's first recorded meteorite (and the second recorded in the United States) arrived shortly after statehood, between 4 and 5 PM on August 7, 1823 at Nobleboro in Lincoln County by a Mr. A. Dinsmore. Mr. Dinsmore thought he heard musket fire and saw a small whitish cloud spiraling earthward which made a noise "like a whirlwind stirring leaves." Something struck the ground nearby, startling a flock of sheep. Mr. Dinsmore dug down half a foot and found 5 or 6 pounds of a sulphurous-smelling material.

Almost 100 grams of the original mass is preserved in museum collections worldwide. The Nobleboro meteorite is of the achondrite type. Though it is the most common type of achondrite, these account for only 3% of all meteorites recovered. The relative rarity of achondrites compared to chondrites makes the Nobleboro specimen the most interesting of Maine meteorites to scientists.



Castine Meteorite

The second Maine meteorite fell at about 4:15 AM on Saturday May 20, 1848 near the village of Castine in Hancock County. A single stone, reported as "not larger than a hen's egg" weighing 42 grams was found by Mr. Charles Blaisdell. An account of this meteorite was published by Shepard (1848) in the American Journal of Science. Pieces of this meteorite have been distributed to museums all over the world including London, Paris, and Budapest. The total weight of all of these specimens is 87 grams, twice the originally stated weight.

The Castine meteorite is a chondrite, and the overall chemical composition of this specimen classifies it as an ordinary chondrite, made up primarily of olivine, pyroxene, and nickel-iron.



Searsmont Meteorite

At about 8:15 AM on Sunday May 21, 1871 a third Maine meteorite fell at Searsmont in Waldo County. The following is a description of the event reported to a local paper which is quoted by Shepard (1871).

"There was first heard an explosion, like the report of a heavy gun, followed by a rushing sound resembling the escape of steam from a boiler. The sound seemed to come from the south, and to move northwardly. The stone fell in the field of Mr. Bean, the flying earth being seen by Mrs. Buck, who lives near. The hole that it made was soon found and the stone dug out. It was quite hot and so much broken as to be removed only in pieces. The outside shows plainly the effect of melting heat. It struck with such force as to penetrate the hard soil to a depth of two feet."

The total weight of the known specimens of the Searsmont meteorite is about 2 pounds. The largest single piece is an 803.4 g specimen at Arizona State University. A chemical analysis was performed by J. Lawrence Smith, a prominent American meteorite expert of the 19th century. He separated the metal with a magnet and found it to contain 90.02% iron, 9.05% nickel and 0.43% cobalt. This places the Searsmont meteorite in the high iron or H-group of chondrites.



Andover Meteorite

The fourth Maine meteorite "fall," landed at Andover on August 5, 1898. The meteorite fell on the farm of Lincoln Dresser who said of the event "It came from the north west and it was accompanied by a loud noise resembling a buzz saw, and had a following of smoke..... I secured, by digging, a large piece weighing 7+ lbs., and two or three small ones which were broken by its striking the rock fence." (Ward, 1903). Despite the fact that a greater percentage of it is preserved than any other Maine meteorite, the Andover specimen has been little studied except for the purpose of classification. It, like the Castine meteorite, is a low-iron or L-chondrite.



Figure 1. The main mass of the Andover meteorite, now weighing 2791 grams is housed in the collection of the Smithsonian Institution.

Walnut Hill Meteorite

Meteorites fall continuously, but their rate of recovery depends on many factors. During the nineteenth century, a meteorite was recovered in Maine about once every twenty-five years. This pattern did not continue into the twentieth century despite an increase in population that should favor an increased rate of recovery. Only one practically unknown meteorite has been recovered in Maine in this century.

A newspaper report in 1978 described a discovery of a meteorite in the town of North Yarmouth. While repairing the roof of a brooding shed on his father's poultry farm, Mark L. Smith noticed a hole near the eaves. He found a small black stone lying a few inches below the top of the plate. The Smiths took it to the University of Southern Maine where it was identified as a meteorite by tests performed by Professor David S. Westerman.



Walnut Hill Meteorite

The Walnut Hill meteorite is an ordinary chondrite, and is completely covered by a thin black fusion crust formed by melting of the outer layer as it fell through the atmosphere. It weighs 218 g. The Walnut Hill meteorite, a "find," is retained by its finder.



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Photo courtesy of the Harvard Mineralogical Museum

Figure 2. Photo of the Walnut Hill meteorite.



Conclusion

Probably fewer than a thousand meteorites survive their fall to Earth in a year. Undoubtedly, many more than five have fallen into Maine, unobserved, unrecovered, or at least unsubstantiated. Maine's five meteorites represent a small but scientifically important sampling of rocks from at least three different parent bodies. The Castine and Andover meteorites are from the L-group parent body. The Searsmont specimen is from the H-group parent body and the Nobleboro meteorite is from the eucrite parent body. This last meteorite is believed to be so distinctive by some meteoriticists, that they believe that it came specifically from the asteroid Vesta.

So keep looking to the stars and you may be the one to discover the "sixth" Maine meteorite.



Fascinating facts about meteorites:

- The single largest meteorite ever found is the Hoba Meteorite, discovered in 1920 in the southwest African country of Namibia. It weighs an estimated 60 metric tons.
- The largest known impact crater is the Sudbury Crater in Ontario, Canada. It is about 120 miles in diameter. Scientists believe it was created 1.85 billion years ago by a meteorite with an estimated diameter of 6 miles.
- The only person in the United States known to have been struck by a meteorite was Mrs. Hewlett Hodges of Sylacauga, Ala. She was resting on a sofa in 1954 when a meteorite weighing about 10 pounds crashed through the roof, bounced off a radio, and bruised her thigh.
- Although meteorites land all over the world, Antarctica is one of the best places to find them. One reason is that after impact, the meteorites are entrained in the ice, and when the ice melts or is eroded, the meteorites become exposed. Meteorites landing in Antarctica are also less likely than meteorites falling elsewhere to have been damaged by such geologic processes as weathering or to have been contaminated by human beings or other organisms.



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