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The Giant Goose Lake Meteorite
From Modoc County
California

(A portion of an illustrated lecture presented before the California
Academy of Sciences, San Francisco, September 6, 1939)

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THE GIANT GOOSE LAKE METEORITE FROM MODOC COUNTY, CALIFORNIA *

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The Giant Goose Lake Meteorite, recovered in Modoc County May 4th and 5th, 1939, is on exhibition in the Astronomy Exhibit of the Golden Gate International Exposition on Treasure Island, along with an excellent exhibit of parts of smaller falls. Never before in the San Francisco Bay area have we had an opportunity to examine in detail such a large and unusual meteorite. One can poke it in the ribs, feel its surface, or study an etched portion, as it lies in state, viewed with awe by thousands who have never before seen a meteorite.

The interesting story of the discovery and recovery of this giant celestial visitor, if more widely known, may stimulate search for other meteorites large and small, of which there must be many, scattered over the plains and mountain slopes of a state with an area as great as that of California. It is surprising that, so far as records show, only nine other meteorites have been found in California.

Of the ten meteorites now recorded as found in California, seven are irons and three are stones. The total weight of the six irons previous to the discovery of the Goose Lake Meteorite is approximately 714 pounds. The years in which these meteorites, no one of which was seen to fall, were recovered is given on Fig. 1. The estimated masses of the other meteorites are as follows:

The *Shingle Springs* iron, which weighed 85 pounds, seems to have been lost after it was studied and described. The *Canyon City*, Trinity County, iron weighed about 19 pounds. It is, I believe, in the Field Museum in Chicago. The *Ivanpah*, sometimes called San Bernardino, originally weighed 128 pounds. It is a splendid specimen and is on exhibition at the State Division of Mines in the Ferry Building, San Francisco. The *Oroville* iron was estimated to have a weight of 54 pounds. It was on exhibition at the California Academy of Sciences in San Francisco before the fire in 1906. It is the opinion of the writer of this article that the iron meteorite of about this weight exhibited at the State Division of Mines, the history of which is obscure though it is labeled *Canyon Diablo*, may be the *Oroville* meteorite. The *Surprise Springs* iron weighing about 3 pounds is in the Field Museum in Chicago. The *Owens Valley*, a splendid specimen of 425 pounds, has found its resting place in the U. S. National Museum in Washington. The small *Muroc* specimens are in the Griffith Observatory, Los Angeles.

The author of this article, speaking upon the subject of meteorites before the Astronomical Society of the Pacific in San Francisco several years ago, using a map of the United States upon which meteorites which have been recovered were shown, emphasized the fact that while California boasted of having the best of everything, in meteorites we were far behind the eastern states. At that time only eight meteorites

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had been reported in California, but since then the fragments found near Muroc and Muroc Dry Lake had been recovered, as well as the Goose Lake Meteorite.

We owe our opportunity to handle, and study, and exhibit this meteorite to the fact that three deer hunters from Oakland, Messrs. Joseph Secco, Clarence A. Schmidt, and Ira Iverson, on October 13,

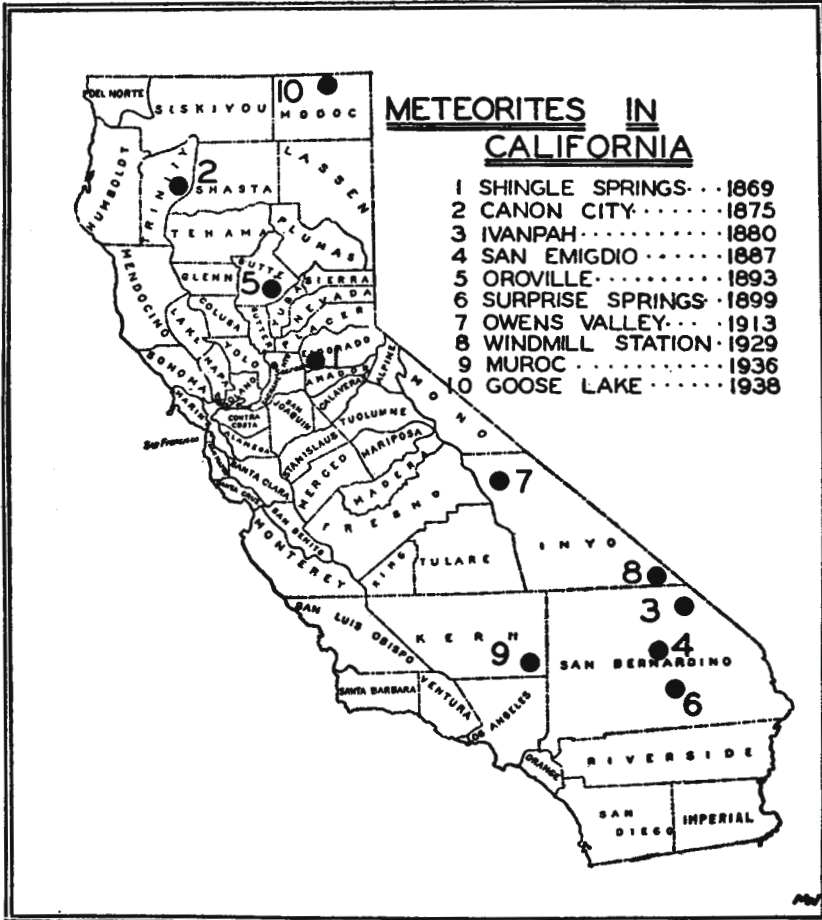


FIG. 1. Outline map of California showing approximate locations where meteorites described in literature have been found, with dates of finding. No meteorites seen to fall in California have been recovered, so far as is known. There must be many undiscovered meteorites scattered over California at the present time.

1938, stumbled upon the mass of rock-like material while roaming over the higher barren portion of the Modoc Lava Beds a few miles west of Goose Lake. That one of the party suspected it was a meteorite is due to education on this subject by Chabot Observatory. A sample was brought back, identified as meteoritic, and in April of this year an expedition was organized to bring out the meteorite.

After it had been relocated among the thousands of lava boulders it was necessary to make a rough survey to determine whether it was

on private property, or in the Modoc National Forest. In this service, Rex Albright, of the U. S. Forest Service Office, in Alturas, rendered assistance.

Having determined that the meteorite lay in a National Forest, the ownership was settled. It belonged by law¹ to the Smithsonian Institution. The first impulse was to let their collectors get it out, for the meteorite was in an area inaccessible except for saddle horses. However, after consultation, it seemed that it might be possible to secure the privilege of exhibiting it at Treasure Island, so telegrams were sent to Washington, and permission was granted.



FIG. 2. Goose Lake Meteorite at Chabot Observatory, May 8, 1939. Meteorite is reversed. The side turned up is the side which rested partially buried in broken lava and soil. The line between the exposed and buried portion can be traced. Lichens are visible on the weathered surfaces.

A small panel truck was secured from Mills College in Oakland, and an expedition under the direction of Dr. H. H. Nininger of the Denver Meteorite Laboratory and the speaker was organized to bring out the meteorite. In this expedition, Dr. F. C. Leonard, and Dr.

¹Under the Act of Congress, approved June 8, 1906 (34 Stat. 225), historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest situated or found on lands owned or controlled by the United States Government, may not be excavated or removed except by permission of the Department of the United States having jurisdiction over the land involved, and under rules and regulations prescribed by that Department. Such rules are subject to the proviso that "the examinations, excavation and gathering are undertaken for the benefit of reputable museums, universities, colleges, or other recognized scientific or educational institutions, with a view to increasing the knowledge of such objects, and that the gatherings shall be made for permanent preservation in public museums."—Walter W. Bradley, State Mineralogist, Sept. 26, 1939.

Robert W. Webb of the University of California at Los Angeles, as well as Mrs. H. H. Nininger, cooperated.

Help was secured from the ranch of Mr. Everly on the Goose Lake Road some 40 miles from Alturas. Everly and members of his family set aside their ranch work, which was pressing, and used their horses and an old wagon body to get the meteorite through the rough terrain. This took nearly three days. However, when the meteorite was brought to Alturas, it was transferred to the Mills College truck in a few moments by using the derrick on an auto wrecking truck.

There would have been little difficulty in recovering this specimen had it dropped upon the highway, or near it; but as it lay far back on the rough lava flow where the surface had weathered into large boulders, and where no road existed, the work of moving it was tedious.

Iron meteorites usually weigh about 500 lb. to the cubic foot. The dimensions of this mass are 3 ft. 10 in. by 2 ft., and 4½ in. by 1 ft. 8 in. The weight was 2,573 lb. If the holes had been filled in, the weight would have exceeded 3,000 lb. The metal in this meteorite is solid, steel-like, and tough as steel. When hit with a hammer on the edge, the meteorite rang like an anvil, and a moderate blow with an ordinary hammer made no mark on the surface.



FIG. 3. Goose Lake Meteorite lying among the lava boulders of Modoc County. Photographed before meteorite had been disturbed, showing largest side exposed to the weather and wind.

Left to right: Rex Albright, U. S. Forest Service, and Mr. Murphy and Mr. Ake, two ranchers who helped recover the meteorite.—*Photo by Earle G. Linsley, April 30, 1939.*

Lichens had been able to establish themselves on the surface, and there were several solid patches about the size of a silver dollar, and one patch nearly twice this size. This lichen growth caused the meteorite to resemble the lava boulders scattered around in great numbers. From these it differed only slightly in color and in general form, as viewed by a casual observer.

These iron meteorites usually show burnt surfaces or skins. The surface is iron black on pieces which have been known to fall recently. However, when old falls like the Goose Lake Meteorite are found, the surface is a rusty brown. On this meteorite the surface exposed to the weather is almost a mahogany color. Though it feels smooth, as one runs a hand over it, there are tiny granules which may be felt on this polished surface. In the numerous holes the edges turn in, and are sharp and jagged on the inside.

The side which rested on and was partially in the soil has the characteristic appearance of rusty iron, but is smooth and nowhere crumbling in disintegration. The prominent external pits characteristic of iron meteorites were far less numerous on this protected side. On the exposed side the external pittings had developed into holes, many of which were several inches deep; some extended through the specimen. There were no sharp edges or angles on the meteorite. There was no accumulation of rusty pieces on the ground around it. There was no evidence of shattered rocks indicating a recent fall, and there were no skid marks to show that the meteorite had swept along the surface and come to rest where it was found. There was only the slight depression in which it rested, which appeared to be due in part to wind erosion as the air currents had eddied about it. A marmot seeking a bombproof shelter had made a home under it.

The questions which have been asked: the length of time the meteorite had lain among the lava boulders; whether it could have fallen on ice; whether it was of the same character as the great Willamette Meteorite of Oregon; whether other pieces are to be expected, are all interesting, but beyond the ability of this writer to answer.

Our hope is that this discovery will result in searches for other meteorites, and that these searches will be productive, so that much may be added to our knowledge of these interesting celestial visitors.

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