

The Amana Meteor

As late as the beginning of the nineteenth century, some men of science ridiculed the idea that stones ever fell to earth from the sky, despite the fact that museums in Vienna, Munich, and London contained concrete evidence to the contrary. Narratives of meteors were usually received with an attitude of scornful incredulity. A special committee appointed in the year 1768 by the renowned French Academy of Sciences to investigate rumors of a "fall" in southern France returned an adverse report in spite of more than three hundred affidavits prepared by eye witnesses of the phenomenon. In 1807, when President Jefferson, who counted himself something of a scientist, was told that Professors Benjamin Silliman and J. L. Kingsley had described a shower of stones at Weston, Connecticut, he is said to have remarked: "It is easier to believe that two Yankee professors will lie than to believe that stones will fall from heaven."

Gradually, however, such a ponderable mass of supporting evidence was accumulated that no intelligent person could longer deny the possibility of solid material falling to earth, some of which, from its very nature, must have originated from that vast outer space lying beyond the limits of our own solar system. Indeed, one hypothesis assumes that the

earth was built up, little by little, in the course of billions of years, through the gradual accretion of planetesimal bodies of varying size, about a central nucleus.

By the beginning of the fourth quarter of the last century, most people of learning were familiar with the accepted tenets of science. With the spread of higher education superstition gave way to reason and natural phenomena became subjects of scientific interest instead of the manifestation of supernatural forces to be feared. In Iowa the total eclipse of the sun in 1869 particularly had been a marvelous lesson in astronomy which gave the sciences a tremendous popular impetus. Meteors, or "shooting stars", as they were frequently called, were no longer viewed as uncanny and mysterious except by those who were inclined toward superstition or religious fanaticism.

One night in the winter of 1875 a marvelous spectacle appeared in the heavens over Iowa which created such a profound impression upon those who were privileged to witness the phenomenon that the memory of it has never been erased from their consciousness. The winter, coldest for many years, had been especially notable for its heavy snowfall, pearly moonlight nights, and exhilarating atmosphere. Temperatures ranging to twenty degrees below zero were not infrequent and frost had penetrated the ground to a depth of nearly five feet in some places. Between the hours of ten and eleven on the night of

Friday, February 12, 1875, many people in southeastern Iowa were returning to their homes from social engagements and the highways were gay with sleighing parties.

Suddenly, without a moment's warning, there appeared in the southern sky, a bright light from which emerged a great ball of fire. Shooting across the sky in a northern direction with tremendous velocity, it lighted up the whole earth as by a flash of lightning except that a reddish and then a greenish tint was imparted to objects. To one observer, it appeared as if "the face of the moon had fallen off and was approaching the earth" obliquely. The moon for a moment was entirely eclipsed by the superior splendor of the meteor. To many the ball of fire appeared pear-shaped, the larger end foremost, as it should be. The color was of "red hot iron, verging to a white heat", and many persons saw sparks flying from it as it passed. Following the phenomenon, reverberating along the path of flight, was a rumbling roar, comparable to the passing of a heavy train over a trestle bridge, and several sharp detonations varying in intensity according to the position of the hearer.

The passing of the meteor came about so suddenly and so unexpectedly that every one seemed stunned by the spectacle. The shock sent the revellers hurrying to their own firesides, as if to await the approach of some impending catastrophe. Those who were near to the line of flight were thoroughly fright-

ened, for the fire-ball, hurled into space apparently from the battlements of heaven, "seemed to come down upon them with a rapid increase of size and brilliancy." Horses reared and plunged to escape, while dogs went howling and barking to places of safety.

"An instantaneous bright light, filling the whole heavens, shone about us, almost blinding us", wrote J. A. Donnell in the *Sigourney News*. "This was followed by a quivering or shaking light, which continued for about two seconds. It seemed to be a combination of zig-zag and sheet lightning, the light being both vivid and diffuse. I stood still, instinctively looking upward. A globe of fire with lines of pale light radiating therefrom appeared to be falling towards the earth from a point about 10° west of the zenith. I could see it drop through a succession of clouds until it came apparently inside of the dome above me, and then for a moment it stood apparently still, and flashed and sparkled like a firebrand. Within a second afterward it started through the atmosphere like a sky rocket, crossed the meridian in the direction of the North Star, and then continued its descent more slowly in the same line until it finally disappeared about 10° above the horizon at a point about 20° east of north."

According to C. W. Irish, a civil engineer who made an extensive and careful investigation of the appearance and course of the meteor immediately afterward, the solid portion at the head was "en-

closed in a pear-shaped mass of vivid white light" fringed with deep red blending with the white and marked by flashes of green, yellow, and other prismatic colors. To observers who stood in front of the meteor, the mass of light appeared round in shape, but "fringed with rays of white and red light" that gave it the appearance of being surrounded with a halo, the rays of which darted out from the center of the head in all directions. The train of the meteor, estimated to be from seven to twelve miles in length, was principally white, though red near the head and edged with yellowish green. From the body of the meteor burst clouds of smoke or vapor "like puffs of steam from the funnel of a locomotive, or smoke from a cannon's mouth," which were suddenly whisked into the space behind, giving evidence of the rush of air into the vacuum caused by the tremendous velocity of the flying mass.

Nearly five minutes after the meteor had flashed out of sight, observers near to the south end of its path heard "an intensely loud and crashing explosion" from the point in the sky where they first saw it. Mingled with and following this deafening explosion came a "rushing, rumbling and crashing sound" that seemed to proceed along the course of the meteor, punctuated at intervals, as it rolled away northward, with the crash of distinct explosions much greater in volume than the general roar of the continuous sounds. This commotion of noise grew fainter as it continued until it died away in

five explosions from the direction in which the meteor was last seen.

But to witnesses near the north end of the meteor's track the succession of sounds was reversed. About two minutes after "the dazzling, terrifying and swiftly moving mass of light had extinguished itself in five sharp flashes, five quickly recurring reports were heard. The volume of sound was so great that the reverberations seemed to shake the earth to its foundations. Buildings quaked and rattled, and the furniture that they contained jarred about as if shaken by an earthquake; in fact, many believed that an earthquake was in progress. Quickly succeeding and in fact blended with the explosions came hollow bellowings, and rattling sounds, mingled with clang, and crash, and roar, that rolled slowly back southward as if a tornado of fearful power was retreating upon the meteor's path."

The meteor was visible as far away as Omaha and Chicago, from St. Paul to St. Louis, the latter place being two hundred and fourteen miles distant from the point where the meteor first appeared. At Mount Pleasant the final explosion was observed as a "brilliant pyrotechnic display" low on the northern horizon. The roar, as of a strong wind, was distinctly heard at a distance of more than fifty miles, while the noise of the explosions carried fully seventy-five miles from the point where the meteor disappeared. Some people thought a boiler had burst, others ran

up stairs to see if the plaster had fallen, and one woman, imagining that her house was on fire, rushed outdoors declaring that she had seen red-hot bricks falling past her window.

As is natural in the description of any event of similiar character, occurring so suddenly and lasting at most but a few seconds, considerable discrepancy occurred in the narratives of the observers. Much of this was due to the various geographical positions of the individual witnesses, as well as to their temperament, intelligence, and education. Under the most favorable circumstances two persons may not see the same thing exactly alike, even though each may be equally sincere and confident as to the accuracy of his own observations. But on one fact there was very general agreement: the meteor appeared between ten-twenty and ten-thirty at night.

Observations on all other factors pertaining to the meteor, such as size, course, elevation, color, brilliance, sound, and detonation, were necessarily dependent upon, and consequently vary with, the location of the observer. To many the fire-ball appeared to be as large as the moon while others thought it was two or three times as large. Similar discrepancies as to other characteristics can usually be explained by the position of the witness, if some allowance is made for natural inaccuracy of human observation. For example, although the meteor actually disappeared about five miles northeast of Marengo, a news dispatch from Dubuque reported

that a "brilliant meteor flashed through the heavens last night, and appeared to strike the earth within the city limits, on the bluffs, in a southerly direction. The light produced illuminated the city with a bright glare, dazzling to the eye, as it penetrated dwellings through windows and lasted for a moment. The ball of fire appeared to be the size of a small balloon or a person's head. Skeptical individuals hastened home considering the visitor a bad omen."

The light of the meteor, from first to last, was exceedingly brilliant. At the southern end of its course the first flash was blinding even to those who were looking away from the point where it appeared. Very few actually saw the meteor at its first contact with the atmosphere because their eyes were overpowered at once. People instinctively turned away or put their hands over their eyes, and so the fire-ball sped on its way for a second or two before it was observed. At one town a group of people facing a church saw the building enveloped in a sheet of flame from steeple to foundation and thought it had been struck by lightning. Thus hundreds of persons were attracted by the unusual appearance of objects and continued to look at the strange scene without seeing the meteor itself. Near the north end of the meteor's path, according to C. W. Irish, "the light was so intense that at the final flash the eyes impressed by it were totally blind to all impression of light for several seconds after". The moon and stars, though shining brightly at the

time, "were utterly blotted from the sky, and the surrounding landscape illuminated as if at noon-day."

Concerning the path of the visitor through the heavens, there was much conflicting testimony, even when the location of the various observers was considered. At Mount Pleasant numerous people stated that the meteor was first seen in the southeast passing swiftly toward the northwest, while at Fairfield, about twenty-five miles westward, it was reported to have appeared in the southwest passing toward the northeast. Obviously one of these reports must have been in error. Scientists proceeded to gather data regarding its course and direction. Professor N. R. Leonard of the State University of Iowa, determined that it travelled from southwest to northeast at an angle of about 18° with the meridian. The course could be approximately marked on a map, he thought, by a line drawn through Agency City and South Amana. The altitude of the meteor above Ottumwa he estimated to be about sixteen miles.

In determining this difficult matter it seems that even scientists failed to agree absolutely, for Professor Gustavus Hinrichs, writing in *Popular Science Monthly* and basing his conclusions upon the careful work of C. W. Irish, stated that the meteor in coming in contact with the atmosphere of the earth became first visible at an "altitude of 150 miles vertically above the little village of Pleasantville in northern Missouri. Descending at an angle

of about 45° towards the earth's surface, it moved a little east of north, gradually deviating more and more toward the east, so as to describe a curve, the concavity of which is turned eastward. This track of the meteor passed a couple of miles east of Centerville and Moravia in Appanoose County, Iowa; almost directly over Eddyville on the Des Moines River; crossed almost diagonally the northwestern (Prairie) township of Keokuk County; passed one and a half miles east of Marengo in Iowa County, and finally exploded over a point three miles southwest of the little station of Norway on the Chicago & Northwestern Railway, over the boundary line of Benton and Iowa counties at an altitude of about ten miles." This seems to be the most accurate description available. The total length of the visible path was about two hundred miles which was traversed in approximately ten seconds, or at the rate of twenty miles per second.

While the meteor was crossing the northwestern corner of Keokuk County, it was seen to divide into two parts, one portion deflecting somewhat eastward but soon losing its brilliancy, and a seven to fourteen times brighter part continuing on its course until the final explosion. The fainter portion produced a meteoric shower in Iowa and Amana townships of Iowa County, many pieces of which were subsequently recovered but no fragment of the brighter portion which exploded farther north has been found. This may be explained by the modern theory

that the brilliant illumination of meteors comes, not from the surface of the stone, but from a gas cap pushed along in front and heated by the terrific friction and pressure. If this is true, the main mass of the Amana meteorite may have been thrown back at the time of the first explosion and descended as "glowing coals", while the dazzling gas cap was carried on at increased velocity by a relatively small fragment which eventually reached the earth in pieces no larger than marbles.

Interest immediately centered upon locating the spot where the meteor struck the earth and the discovery of fragments if possible. There were many guesses as to where the "glowing coals" had descended, most of them quite erratic. The first fragment was found by Sarah Sherlock on her way to school about two miles west of Homestead. This meteorite weighed seven pounds and six ounces. Immediately scientists and others hastened to the vicinity of Homestead and the search began in earnest but without much success. It was not until the farmers began cultivation in April and May that numerous small stones were discovered, most of them weighing less than ten pounds. Fragments recovered in the timber were located by observing broken twigs and scars where the flying particles had struck the trees. The meteorite field was approximately three miles wide and five miles long extending south of the Iowa River and southwest of Homestead.

Meanwhile C. W. Irish, influenced by mathematical

computations, had instituted a futile search north of the river. In the spring, however, the two largest meteorites recovered were unearthed in a field just south of High Amana. One piece weighed seventy-four pounds and the other forty-eight. Both had penetrated the frozen ground to a depth of about two feet. In the course of two years and a half over eight hundred pounds of meteoric stone had been recovered and distributed all over the world by collectors and men of science. Some of the stones were sold to the famous European museums, though two of the largest specimens and numerous smaller fragments are deposited by the Amana Society in the geological collection of the State University of Iowa.

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