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The Stars That Fall— and Mr. Manalo

JOSEPH J. KAVANAGH

AN ARTICLE on the *Iglesia Ni Cristo*, published in this Quarterly in March of the current year,¹ contained a brief summary of a booklet written by Mr. Felix Manalo, and entitled *Ang Sulo sa Ikatitiyak sa Iglesia Katolika Apostolika Romana*. In the article, reference was made to the explanation Mr. Manalo proposes of a prophecy which occurs in the sixth chapter of the Apocalypse. The text of the prophecy reads: "And I saw when he opened the sixth seal, there was a great earthquake, and the sun became as sackcloth of hair, and the whole moon became as blood, and the stars of heaven fell upon the earth, as the fig tree sheds its unripe figs when it is shaken by a great wind." (Apocalypse 6. 12-13).

Mr. Manalo maintains that this prophecy has already been fulfilled. The phenomena predicted, world-shaking though they may seem, have actually occurred. He goes so far as to indicate the exact date on which each took place. For example, he claims that the falling of the stars mentioned in the Apocalypse occurred on November 13, 1833.

In the following pages an attempt has been made to present an account of what actually happened on that particular date, together with a scientific explanation of the phenomenon. It is hoped that it will prove interesting and informative read-

ing even apart from its connection with Mr. Manalo's essays at biblical exegesis.

Mr. Denison Olmstead, who was a professor at Yale College at the time, and an eyewitness of the phenomenon, described it as follows:

About daybreak this morning our sky presented a remarkable exhibition of fireballs, commonly called shooting stars. The attention of the writer was first called to the phenomenon about five o'clock from which time until nearly sunrise the appearance of these was striking and splendid beyond any thing of the kind he has ever witnessed.

To form some idea of the phenomenon, the reader may imagine a constant succession of fireballs, resembling rockets, radiating in all directions from a point in the heavens . . . the balls just before they disappeared exploded . . . No report or noise of any kind was observed . . . there were meteors of various sizes and degrees of splendor, some mere points, but others larger and brighter than Jupiter or Venus; and one was nearly as large as the moon. The flashes of light were so bright as to awaken people in their beds. . . .²

An observer in Augusta, Georgia, described the same spectacle as it appeared to him:

At about 9:00 P.M. the shooting stars first arrested our attention increasing both in number and brilliancy until thirty minutes past 2:00 A.M. when one of the most splendid sights perhaps that mortal eyes have ever beheld was opened to our astonished gaze. From the last mentioned hour until daybreak, the appearance of the heavens was awfully sublime. It would seem as if worlds upon worlds from the infinity of space were rushing like a whirlwind to our globe . . . and the stars descended like a snowfall to the earth . . . Occasionally one would dart forward leaving a brilliant train which . . . would remain visible some of them for nearly fifteen minutes . . .³

This "awfully sublime" sight caused immense terror among the ignorant and superstitious. Many of them believed that Judgment Day was at hand. ". . . in 1833," the account in the *Encyclopaedia Britannica* states, "it is certain that the ignorant thought the end of the world had come."

Although the events of November 13, 1833 did not prove to be the herald of so tremendous an event as Judgment Day, they did usher in a new period in the science of astronomy.

That date may truly be said to mark the birth of meteoric astronomy, the scientific study of meteors and meteor showers. For what occurred on November 13, 1833, was, in scientific language, a "meteor shower."

The phrase demands an explanation.

Meteors are small bodies composed for the most part of a mixture of iron and stone. Countless numbers of them are floating about in outer space. The largest may be a few meters in diameter. Most are much smaller. The vast majority of them are no bigger than a drop of water or a grain of sand.

They enter the earth's atmosphere at tremendous speeds ranging from 24 to 240 kilometers *per second*. The atmosphere offers resistance to their passage, and the friction thus caused makes the meteors white hot and incandescent. It is thus they become visible as white streaks across our sky. They appear larger than they actually are owing to the envelope of glowing gas that surrounds them in their flight, as well as to irradiation. Usually they are completely burned up and disintegrate in the course of their precipitous passage through the atmosphere, and fall to earth as very fine dust. Three hundred and sixty tons of this "star-dust," according to one authority, settle down upon the earth in the course of a single year. If any of these bodies are large enough to reach the earth as solid masses, they are called meteorites. Astronomers estimate that millions of meteors and micro-meteors enter the earth's atmosphere every day.

A meteor *shower* is an especially strong and brilliant display of flaming meteors. The phenomenon of November 13, 1833 was such a shower.⁴ Although more than ordinarily striking, the "falling of the stars" on that occasion was not a unique happening. We know from eyewitness accounts that a similar spectacle occurred on November 11-12 in the year 1799.

Friedrich, Baron von Humboldt (1769-1859), the famous German geographer and traveler, happened to be in Cumaná, Venezuela, at the time and left a description of it. He stated that thousands of meteors and fireballs were visible,

moving regularly from north to south; that there was no part of the sky so large as twice the earth's diameter that was not filled each instant by some meteor or fireball. The fireballs were consumed without leaving any sparks, but leaving bright trains behind them lasting from fifteen to twenty minutes. The light of the meteors was white. He saw the phenomenon for four hours, daylight only putting an end to it. A few were even seen a quarter of an hour after sunrise. However the maximum had been passed about 4:00 A.M., November 12th. Inquiry among the natives of the region elicited the information that in 1766 a similar shower had been seen.

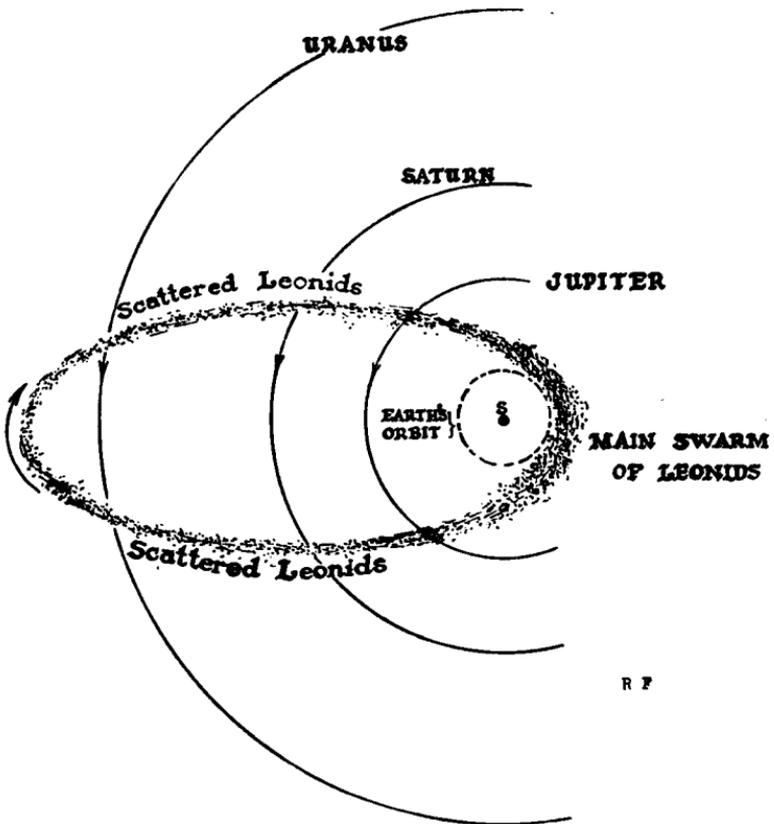
A certain Andrew Elliot, who was traveling at the time from Philadelphia to New Orleans, has also left an account of the 1799 shower. He wrote:

November 12, 1799, about three o'clock A.M., I was called up to see the shooting of the stars (as it was commonly called). The phenomenon was grand and awful; the whole heavens appeared illuminated by skyrockets which disappeared only by the light of the sun after daybreak. The meteors which appeared at any one instant as numerous as the stars flew in all possible directions except from the earth, toward which they were all inclined more or less; and some of them descended perpendicularly over the vessel we were in, so that I was in constant expectation of their falling among us.⁵

Again in the years 1866 and 1867 around November 13th, there were brilliant displays of shooting stars visible in the western hemisphere.

From what has been said thus far, and from the data provided in the accounts cited above, it is evident that extraordinary meteor showers recurred at regular intervals in the century 1766-1866; that is, they took place around the thirteenth day of the month of November at intervals of approximately thirty-three years. One other recurrent factor which observers noted was that the meteors always seemed to radiate from the same part of the sky, namely a section in the vicinity of the constellation Leo (Lion). For this reason the phenomenon is known in astronomy as the Leonid showers.

How do astronomers explain this surprisingly regular recurrence of falling stars? The best explanation appears to be this. (The accompanying diagram may make it easier to follow.)



The earth, like a huge space-ship, is traveling in an orbit around the sun at the incredible speed of approximately 18 miles per second. Despite this speed it takes a full year to complete its circuit. Also traveling around the sun, but in a much larger orbit, is a stream of meteors which requires $33\frac{1}{4}$ years to complete its circuit. The meteors are not distributed uniformly in the stream. At one place in particular they are concentrated in what may be termed a swarm.

The orbit of the earth and the orbit of the meteor stream cross at one point. Consequently, each year the earth, in its swing around the sun, runs into the meteor stream. The result of this encounter is a meteor shower. Since the earth travels at a uniform rate of speed, the meeting takes place at a more or less fixed time each year—the month of November in the case of the Leonids. But the main swarm of meteors in the stream is encountered only every $33\frac{1}{4}$ years. Therefore though there is a meteor shower of varying intensity every year in the month of November, a particularly striking and brilliant display occurs only every thirty-three years.

Perhaps a comparison may render the explanation a little clearer. Picture a race-track in the form of an elongated ellipse. At one end of the track there is a merry-go-round, part of which extends over the course of the track. A person riding on the merry-go-round makes a complete circuit, let us say, every minute. Now let us suppose there are bees flying around the race-track. They are strung out all along the length of the track, although at one place they are concentrated in a dense swarm. They move at a speed which requires $33\frac{1}{4}$ minutes for them to make the complete trip around. The person on the merry-go-round will encounter some bees each time he passes over the edge of the race-track; but once every $33\frac{1}{4}$ minutes (if he has the endurance to ride that long) he will run into the swarm.

An objection may arise at this point. Why was this discussion limited to the century ending in 1866? Was there no shower of extraordinary proportions observed in November of the years 1899 and 1933? As a matter of fact, astronomers made rather elaborate preparations to observe the phenomenon expected in 1899. But they were disappointed. There was a moderately good display, but nothing comparable with the spectacle of 1833 and 1866. Why?

According to the article on meteors in the *Encyclopedia Americana* some of the astronomers of 1899 had expected to be disappointed. "Before the time arrived [for the 1899 shower]," the article states, "astronomers had begun to foresee the probability of a disappointment. Dr. Johnstone Starey and Mr. A.

M. Downing had calculated the perturbative effect of Jupiter and Saturn upon the swarm, the action of these planets having been particularly effective after 1867, and had pointed out that the result must have been a swerving inward of the meteoric orbit so that it could no longer intersect the earth's orbit at the old meeting place." Later astronomers accepted this explanation. Fletcher G. Watson, for instance, in *Between the Planets*, writes: "Between 1866 and 1899, the meteors passed near both Jupiter and Saturn; these planets pulled the particles [meteors] aside so that the earth passed through only the fringes of the swarm."⁶ Further perturbations so deflected the stream's orbit that in 1932-1934 the shower was decidedly weak.

What of the future? Will the Leonid stream ever again provide us with a strikingly brilliant meteor shower? Warren K. Green, writing in Van Nostrand's *Scientific Encyclopedia* says: "It is not possible to make definite predictions for the future. It should be pointed out however, that in the centuries preceding 1833 there are several instances in which we find no record of striking displays. It is very possible that perturbations may again bring the main swarm into such a position that the earth will again pass through it giving rise to showers comparable with that of 1833."

The Leonid showers are by no means the only showers that occur. There are several other major showers which can be observed regularly on more or less the same date each year. For example there are the Lyrids which appear on April 20th; the Perseids on August 10th-13th; the Orionids on October 20th-23rd; the Geminids on December 11th-13th. The showers most easily observed in the Philippines are those of August and November.

To return finally to the question which gave rise to this discussion, what is to be said of Mr. Manalo's interpretation of Apocalypse 6.13? When the Bible speaks of the stars falling, does it refer to nothing more than shooting stars or meteor showers? And in particular, was it precisely the meteor shower of November 13, 1833, and that alone, which the author of the

Apocalypse meant when he said "the stars of heaven fell upon the earth?"

The answer is, quite obviously, no.

Most commentators today agree that such statements as "the sun will be darkened, the moon will become blood, the stars will fall," are not to be taken literally. They are figurative expressions employed by the author either to describe some general convulsion of nature, or merely for the purpose of emphasizing the tremendous importance and significance of the event he is foretelling. Descriptions similar to that of Apocalypse 6.12-13 are to be found also in Isaias 13.10; Matthew 24.29; Mark 13.24-25. And in the non-canonical, apocalyptic writings so popular among the Jews of Our Lord's time, the expressions occur with such frequency as to justify the opinion that they had become stereotyped.

But even if the words in the Apocalypse prediction were to be taken in their literal sense there would still be no sound exegetical basis for claiming, as Mr. Manalo does, that they were fulfilled by the phenomenon of November 13, 1833. The context suggests an event much more unique and far more cataclysmic in its nature than a recurrent shower of meteors.

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- 1) PHILIPPINE STUDIES, III (March 1955) 19-42.
- 2) Charles P. Olivier, *Meteors*, (Baltimore, Williams and Wilkins, 1925) pp. 23 ff.
- 3) *Ibid.*
- 4) Mr. Manalo himself in *Ang Sulo* states that the phenomenon was a shower of meteors or "bulalakaw".
- 5) *Transactions of the American Philosophical Society*, June 26, 1804.
- 6) Fletcher G. Watson, *Between the Planets*, (Philadelphia, Blakiston, 1941) p. 120.