# WHEN THE EARTH BORES A HOLE THROUGH THE TAIL OF HALLEY'S COMET

*May 18, 1910, Will Be the Biggest Day in Astronomical History, When for the First Time the Coming Celestial Stranger's Eccentric Orbit Will Cause Its Meteoric Appendage to Fan the Surface of the Globe. All Scientists Admit There Will Be a Collision, and Camille Flammarion Says There May Be Disaster, but the Astronomers at Yerkes Observatory Tell The Sunday Tribune Readers That No Serious Harm Can Come to the Inhabitants of This Planet.*

MAY 18, 1910.

Look it up on your calendar and, when found, make a note of this date. On that day this old world is going to do something that it probably never did before and probably never will do again. It is going to give the lie in most emphatic and convincing fashion to the adage that there is nothing new under the sun. On May 18, 1910, this planet earth is going to pass through the 15,000,000 miles long tail of Halley's justly celebrated and popular comet at the same time the comet crosses the face of the sun. In other words, on that date the earth, Halley's comet, and the sun will all three be lined up in a row in the order named; and this is something that the chances are about 10,000,000 to 1 never can happen again. Even the sun itself, getting along in years as it is, probably never before had the chance to see this comet directly between the earth and itself. It is an astronomical coincident unparalleled in the history of star hunting. Astronomers all over the world are excited about it.

BUT——

No one else need be excited. Nobody is going to get hurt. In spite of the widely published predictions of a certain class of astronomers, Halley's comet is not going to destroy the earth. It is not even going to interfere with its career in the least. The staff of Yerkes observatory stands sponsor for this assurance.

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### *Earth Positively in No Danger.*

"At its best," assures Prof. E. E. Barnard of the staff of Yerkes observatory at Williams Bay, "the comet's tail will be but an interesting phenomenon. There probably will be an illumination of the evening sky. But probably nothing more. We will be 15,000,000 miles away from the comet. Positively, there is no danger to this planet."

"At its worst," supplements Prof. E. B. Frost, the observatory director, "there will be a meteor shower. But even this will mean no danger to our planet. The 'predictions' of some scientists who profess to see Halley's comet wiping out the earth on May 18 are not based on common sense and knowledge. The circumstance of earth passing through the comet's tail while the comet is between it and the sun is a startling one; but let it be published far and wide; there positively is no danger of the destruction of our world."

With these assurances in its mind the pub" may go about its business without a second's worry about the earth lasting later than May 18. It is going to last. It will be doing business on the morning of May 19 just the same as it was on the 17th. It may be the richer by a few choice meteors switched off the comet's tail, but that isn't a serious matter. There have been meteor showers before and the globe still whirls.

Camille Flammarion and other prophets who publicly have debated the question of a grand terrestrial knockout May 18 have alarmed the public unnecessarily. Although the average busy American citizen has refused to get excited over the predicted prospect of not having any world to live on after that date, in many sections of Europe these wild prophecies have had a dire effect. In fact, Halley's comet has been as effective in stirring up and governing the actions of many Europeans of the ignorant class as would an earthquake or other actual calamity.

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### *Flammarion's Prophecy Alarms Europe.*

Flammarion's first prophecy came in January, when he predicted that the comet would put an end to this sphere about the 15th of March. The news spread like wildfire and actually upset the continent for weeks. The effect of this prophecy, coming over the distinguished name of Flammarion, played havoc with the carefully ordered lives of the peasants of France and Germany. Thousands of them actually stopped work and refused to plan for the future. The world was coming to an end in March; what was the use of planning beyond then?

In Germany a town councilor of Cologne, a man of wealth and position, refused to vote for a proposed improvement in the city's water works because, he said, since the world was going to be destroyed in a month or two, there was no use in spending money foolishly. In Silesia the alarmed peasants drew all their savings out of the banks and spent the money prodigally, determined to have as good a time as they could in the few months left. In Baden farmers refused to sow their fields because they were convinced that the comet would destroy the earth before the crops could ripen. So serious did the matter become that the government was forced to take a hand and print and circulate thousands of letters showing that fears about the comet were all illusionary.

In the southern part of this country, among the colored people, the news of this prediction also began to circulate. The superstitious darkies immediately began to see signs and omens, refused to work, and began to loaf and pray their time away, waiting for the fatal day in March. Later Flammarion changed the date of his prophecy to May 18. Then, said he, would occur the phenomenon of earth passing through the comet's tail, and the tail, being composed of poisonous gases, would destroy practically all animal and plant life on this planet. But, while it is true the earth will pass through this renowned tail on the date mentioned and that there certainly is poisonous gas in the tail, there will be no danger to life or planet.

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### *Gas Bogy Causes Needless Alarm.*

"A pint of poisonous gas distributed over two cubic miles of earth's atmosphere would not harm a fly," says Prof. Frost, speaking of this feature of the collision. "That probably is about the proportion in which earth will be visited by the gas from this comet's tail. Of course, exact calculations in such events are impossible, but such as we are able to make with confidence may assure everybody that the poisonous gas bogy is not to be feared at all. Here in Chicago a possible illumination of the evening sky will be all that will tell us of the comet's passing. The gas will not reach us in noticeable quantities."

Therefore, again, quit worrying if you have been worrying. We neither will be smashed to pieces by solid matter nor poisoned by foul gases. The tail of the comet is not solid enough or dangerous enough in any way to hurt us in the least, and if we don't happen to look up at the sky on the big night we will not even notice that earth literally is passing through an experience altogether unique in its career.

Here is the situation: Halley's comet travels around the sun in an opposite direction from that followed by the earth; thus they are at present rushing toward each other. Its orbit is on a different plane from that of earth, Mars, Mercury, Venus, and the other great planets. The orbit of these planets may be described as a plane, with the sun as its center. But Halley's comet, defying the rules that govern the planets, comes from its journey in the far away heavens and enters and goes through the planets' orbit at an angle.

Now, it happens that in this year of grace 1910 it passes through the planet orbit at a point that brings it directly between earth and the sun. There are countless millions of other places that it could go through, countless other places that it has gone through in the past and will go through in the future. But this year it happens to have picked out for its dive through the planet orbit the single spot of all that could bring about the remarkable juxtaposition of sun, comet, and earth. And that is why May 18 will be an altogether unique day in the history of this world.

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### *Visitor as Seen Through Telescope.*

In form this occasional visitor to our section of the heavens is considerably different from the notion of the average layman. Looking at it through a large telescope, one sees only a single speck of bright, solid light, with a tail of considerably less brightness. The head, or nucleus, of the comet is solid matter, as solid and bright as any star, composed, it is supposed, of a heap of meteoric fragments; the tail is so thin and scattered that Prof. Barnard, at Yerkes observatory, photographs other stars through it as a matter of course. It is not even dense enough to obstruct the view of the stars beyond it. Wherefore, says the staff at Yerkes observatory, it is not solid enough to be a serious proposition.

"It is the effect of the sun upon the comet that creates its tail," says Prof. Barnard. "Just how it acts we do not know, but the sun, shining upon the nucleus, forces outward from the comet the substances and light that form the tail. As the comet nears the sun the effect of the latter naturally becomes more powerful and the tail becomes longer. April 19, when the comet is at perihelion, nearest the sun, the tail will be at its longest, and may be 20,000,000 or 30,000,000 miles long. May 18, when it passes between earth and the sun, the tail probably will be over 15,000,000 miles long, or long enough to sweep over this planet. But the fact that other stars may be photographed through this tail indicates that it is little more than a mass of light."

At present there is no Halley's comet, so far as observation from this side of the world is concerned. It ceased to be observable on the 8th of March, when it began to pass on the other side of the sun. At this date, March 27, it is almost directly on the opposite side of the sun from the planet earth and therefore is not observable. Nothing will be seen of it in these latitudes until about April 17, when it may be observable for a short time in the morning sky just before dawn.

Since 1759 every seventy-five years astronomers all over the world have watched out for the return of this comet, and true to conclusions of Halley its appearances has been made as per schedule. Through historical events it has been associated with social disturbances until in parts of Europe it has come to be taken as a sign of evil times for the poor classes. Its last previous appearance was in 1835, and at that time there were labor troubles in France and England. Since being first sighted on this trip there has been a general strike in Sweden, socialist riots in Germany, and the first general labor strike in the history of America at Philadelphia, which may or may not be taken as "signs."

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### *German First to Welcome Visitor.*

Prof. Wolff of Heidelberg was the first earth being to welcome the comet on its return, he discovering its presence on a photograph which he made of the heavens Sept. 11, 1909. Soon after it was picked up by the great telescope at Williams Bay, and ever since the staff of the Yerkes observatory each night have been greeting Halley's comet as a long lost friend who has returned. Every evening, as soon as the darkness permits of satisfactory observation, the work of recording the movements of heavenly bodies begins. During every hour of night time one of the staff has his eye at the lower end of the great sixty-two foot telescope with its forty inch refractor which has served to make Williams Bay known all over the world.

Day and night are reversed in importance in the big building on the hill above Lake Geneva. Darkness is the welcome sign for the beginning of the day's labors. In the daytime the great dome covered room which houses the famous telescope is apt to be deserted save for the chance visitor, but at the first sign of darkness Prof. Frost, Prof. Burnham, Prof. Barnard, Oliver Lee, Mr. Fox, or Mr. Parkhurst will be found there, one of them with his eye glued to the telescope, studying the sky with a familiarity that the uninitiated would think impossible. They talk about it as the average citizen talks about an acquaintance.

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### *How a Comet Is Photographed.*

Prof. Barnard is "the man who finds comets." More than that, he makes photographs of them so that the rest of the world may know just what they look like. To photograph a comet you first get a sixty-two foot telescope and locate it at a favorable point. Then you point your telescope at the part of the sky you want to photograph. Then unscrew your eyepiece and insert a plateholder with an old fashioned portrait plate in it—good telescopes are made so that they may serve as cameras on short notice. Then you follow your comet as it dashes through the sky with the lenses of your telescope. Make your exposure for about an hour, develop, and print, and the picture is yours. The photographic plate, being much more sensitive than the human eye, will find lots of things in the sky that you couldn't see; and they will all show when the plate is developed.

This is what Prof. Barnard has been doing ever since the Halley comet was "picked up" by the Yerkes telescope. As a result this observatory, the Chicago university's astronomical department, has been able to follow and record the comet's actions with a faithfulness probably not equaled in the world. Sir Robert Ball calls Prof. Barnard the greatest living astronomer. Barnard would laugh if you intruded such information on him. He is a heavy set man of about 52, and he began the self-training that was to make him a sky expert when he was a boy working in a photograph gallery in Tennessee.

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### *Vastness Makes Visitor Wonder.*

The great instrument, on its iron and brick foundation, stands fixed in the center of the room, and the floor moves up and down at the will of the man at the motor. It is all simple and all on such a vast scale that the new visitor has only the ability to gasp at the way in which science is reaching out toward the skies.

"Yes, that's a large instrument," agrees Prof. Frost. And if the telescope could hear it would know that it was getting a compliment.

And at 8 p. m. on the evening of May 18 all the machinery of the observatory and all the eyes and all the intelligence of the staff will be directed toward an observation of Halley's comet as the planet earth is passing through its tail. It will be a great day and night for the astronomers. All over the world, wherever there is an observatory, the telescopes will be searching for the comet. A chain of observatories, circling the globe, will follow its feat of crossing the face of the sun. In India, China, Japan, Philippine islands, Hawaiian islands, America, and Europe astronomers will be on the qui vive. The American Astronomical society has gone to the length of equipping and sending forth an expedition to Honolulu, the Pacific ocean, covering about one-third of the earth's girdle, being without any adequate observatory and it being necessary for a complete record of the phenomenon that this vast distance be equipped.

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### *Phenomenon as Seen Around Chicago.*

At 8 o'clock in the evening it is expected the phenomenon first will make itself apparent around Chicago. At that hour the observatory at Williams Bay first expects to begin its observations. The comet's tail is so large that it will fill the whole evening sky, and if its length is what it is estimated to be at that date—15,000,000 miles—it should provide an illumination that would be apparent to anybody who takes the trouble to look up. As the comet goes swishing on its way through space its tail will swing outward from the sun and, as it were, sweep around this world with its faint luminosity. If the should happen to be astronomers on the planet Ven and they were equipped with telescopes equal to th used by earthly astronomers today, they would be a to study both the comet and its tail as it illumina earth.

BUT—there will be no collision. There will b destruction of life through the medium of pois gases. There will be no smashing from contac a solid body. Old Mother Earth, gently b the luminous tail of Halley's comet, will g as it has been going for some time, and and all other earth dwellers will get up i ing and go to work just as if we hadn' 15,000,000 miles of anything during the May, 18, 1910. Look it up on you when found, make a note of it. Fo comet returns you probably won't the phenomenon is repeated.

# Halley and His Comet.

*By RUEL W. ROBERTS.*

UP to the time of Edmund Halley no distinction was made between periodic and unexpected comets, and no one recognized the fact that the same comet might return a second time. Aristotle and many in his day believed comets nothing more than "exhalations inflamed" in the upper atmosphere. Ptolemy, who contributed much valuable knowledge to the subject of astronomy, held much the same view and never even mentioned them in his great work, "The Almagest." But here is where Halley did a great service to science, and so we may take a brief look at his life and his contributions to the knowledge of mankind.

Nearly every schoolboy is familiar with the name of Newton, but few know anything about Halley except as his name has been appended to his comet. His contribution is of no less importance than Newton's. In fact, he was a great friend of Newton, and had it not been for Halley and his friendship we might never have known anything at all about Newton. His world renowned work, the "Principia," which contains the results of his labors on the universal law of gravitation, would never have been published but for the persistent efforts of Halley, who finally persuaded their publication, and even then Halley paid the cost from his own small income.

Halley applied these principles so as to include not only planets but the orbits of comets also. He carefully observed the great comet that appeared in 1682 and calculated its orbit and found that it was the same one that had appeared in 1607 and 1531. By a careful study of these three appearances he predicted its return again in the latter part of 1758 or early 1759. He knew of course that he would not be alive to witness this visit and he left this somewhat plaintive plea: "Wherefore, if, according to what we have already said, it should return again about the year 1758, candid posterity will not refuse to acknowledge that this was first discovered by an Englishman." It actually appeared on Christmas day, 1758, and comets have since been recognized as moving as definitely in their paths as the planets.

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### *Comet Really an Old Friend.*

But this does not reveal all the historic interest centering in this already remarkable comet. By carefully studying the ancient records, especially the Chinese, we find descriptions in more or less satisfactory form of every return since 11 B. C., and it is most probable that we have a trace of it as far back as 240 B. C., if not one as far back as about 400 B. C. So Halley's comet is an old friend of the earth and we should get acquainted with it, for its traveling habits are so regular that we can surely expect it here again about 1986 or 1987. If you ever go out its way in space you will surely find a well beaten track, for it has been traveling one path a great many centuries.

We have drawings of this comet as it appears as far back as 684 and 1066 A. D. Many have been made since, though we have no photographs of it, as photography had not been sufficiently developed at the time of its last return in 1835. Later it was considered the precursor of the conquest of England by William of Normandy. It was a magnificent object in 1145 and again in 1223, when it was supposed to foretell the death of Philip Augustus of France. In 1450 it was an unusually brilliant object.

Tradition has it that it was formally excommunicated by Pope Calixtus III. in a bull mainly directed against the Turks, who were then invading eastern Europe. It was regarded with great superstition at that time, as the Turk had just mastered Constantinople, and so as a protection against this eastern invasion there was added to their usual Ave Maria the additional prayer, "Lord deliver us from the devil, the Turk, and the comet."

The period of Halley's comet varies from about seventy-four to seventy-nine years, accordingly as to whether its speed is increased or diminished by the planets, especially Jupiter and Saturn, which may chance to come near it at this end of its journey. So one can at once see that it is a complicated mathematical problem to deduce carefully these influences and ascertain the exact date of its appearance. At this return in 1910 the period is one of the shortest known.

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### *Predictions a Tribute to Man's Skill.*

Realizing thus the difficulty of figuring out carefully its variations one can see the success attained when it is known that even in 1835 the predicted return was but a few days at variance with the actual appearance, and now in 1910 the most accurate prediction was but two days off from the actual time of return. In this we have not only a beautiful tribute to the skill and knowledge of man but a remarkable testimony to the great regularity of the laws that operate in the universe, so accurate that even a varying journey period of a comet can be definitely determined. If a person were to take a long journey of seventy-five years he would certainly be doing well if he got back within two days of his promised time, having traveled all that time.

The astronomers began early in 1909 to search for the comet. I know of one leading astronomer who was sorely in need of rest and was strongly urged by his wife to take a vacation last summer, but he refused and staid at home, for he wanted to have the honor of being the first to rediscover Halley's comet. The search was largely made by means of the photographic plate, which will take impressions of objects so dim that the naked eye cannot see them in the same telescope used for photographing it. So the astronomer continued to take these photographs of different sections of the heavens night after night in that part of the sky where the visitor was expected.

Astronomer Wolff of Germany first located the comet on Sept. 11 last and a few days later the astronomers at Yerkes observatory were able actually to view the object visually through the telescope—Prof. Burnham having this honor. It was faint then, but has been gradually growing brighter, so that it may now be seen by a small telescope or opera glass if one uses his opportunity before the comet passes behind the sun the latter part of March.