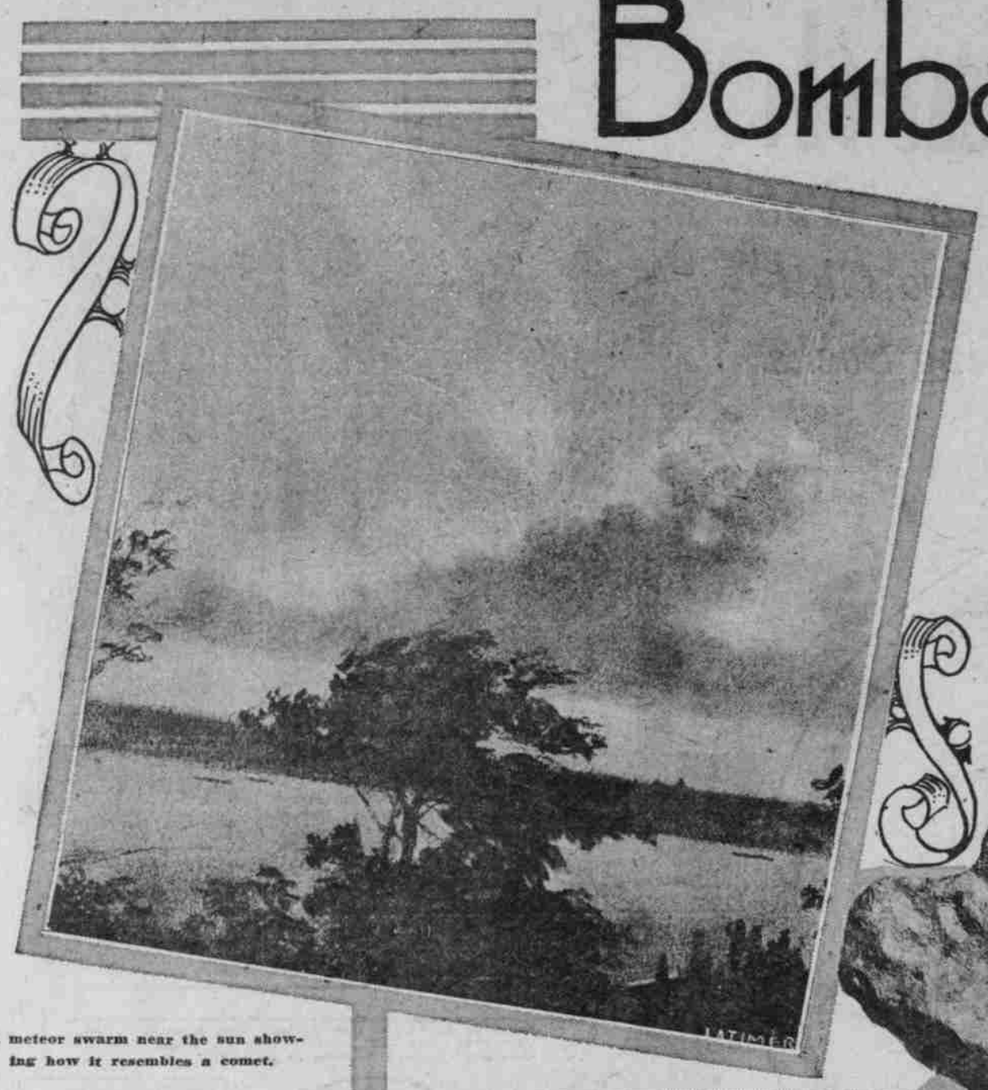
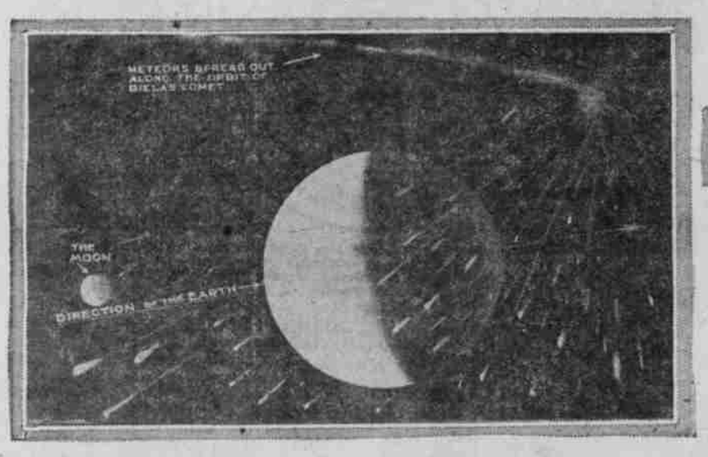
How the "Heavenly Twins" Will Bombard the Earth

A Hailstorm of Meteors May Shower Us When We Begin Crossing the Path of Biela's Big Comet on November 27

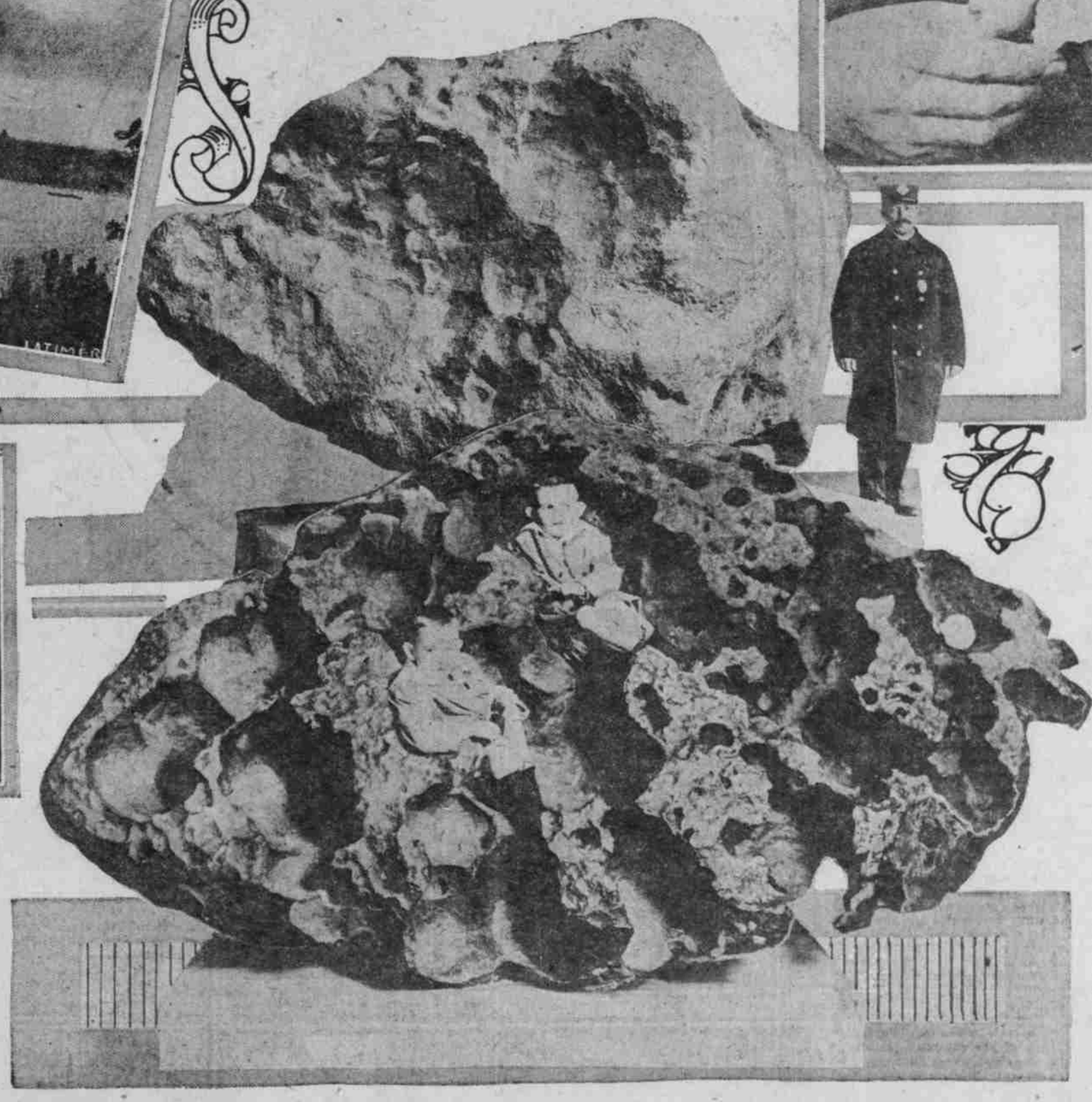


A meteor swarm near the sun showing how it resembles a comet.



An artist's conception of how the earth will pass through the flying particles of Biela.

E. O. Hovey, curator of geology at the American Museum of Natural history, examining a piece of Biela's comet.



Courtesy of American Museum of Natural History.

Above—How one heavenly visitor, the meteor Ahnighito, compares with a tall man. Below—Photograph of Willamette meteor, the 15½-ton specimen now at the American Museum of Natural History. Note the boys snugly stowed in the "pocks" of the meteor.

BY LATIMER J. WILSON.

EARTH is about to enter the barrage of the great guns of Biela's comet. The date that science fixes is November 27. This will be the first time the terrestrial ball has run the gauntlet of the comet's fusillade since 1872, and scientists all over the world are awaiting the ordeal with great interest.

Biela's comet, a scientist at the American Museum of Natural History informed me, is the original "heavenly twins." It got that sobriquet by splitting in the middle some years ago and thereby creating as much sensation among astronomers as the "heavenly twins" of New York, who 20 years ago, first introduced the woman with the bloomers by appearing on a tandem clad in those ideal articles of apparel for the cycle path.

While the man in the street contemplates the possibility of the proximity of Biela's comet with a sneaking feeling of dire happenings, the cold and calculating scientists, such as Curator of Geology E. O. Hovey of the museum, count much on a lucky arrival that may furnish more opportunity for meteorological investigation than the mighty sections of comets now at the museum, which are reproduced on this page.

"Biela's" began as a comet, and is one of the best proofs that a comet is largely composed of small bodies, fragments of stone and iron. On February 27, 1827, Biela discovered a comet which was found to be identical with that of 1772 and 1805. It was not one of the largest comets, but its periodic returns were watched with much interest. In the return of 1832 great excitement was caused by the announcement that the head of Biela's comet would occupy the plane of the earth's orbit directly in the course of the earth's passage. The people thought a collision with the body was inevitable, and an extraordinary sensational comet scare prevailed. Then it was announced that the comet would occupy this position about a month before the earth got to the place. By that time a distance of fully 50,000,000 miles would separate us from a possible collision.

But a series of remarkable events were to follow. In 1845 the orderly return of "Biela" was observed and every telescopic eye was turned upon it. Nothing unusual happened until the following January, 1846, when the comet suddenly split in two. By February the two separate comets had drifted 142,000 miles apart! A sort of filmy bridge of light connected the two bodies.

In September, 1852, Biela's "twins" came back to visit us. By this time they were 1,250,000 miles apart. There had been no apparent reason for the splitting of the comet into two separate masses, and the event ranks with astronomical mysteries. Stranger thangs were yet to happen. The twins were eagerly looked for at the time of their next favorable return. But they failed to appear, and a vain search was kept up in 1859, 1866, 1872, 1877, 1885.

The course of Biela's comet intersects the orbit of the earth at a point which is reached by the earth on the 27th of each November. According to the calculations, the head of the comet in 1872, had it been observed, would have passed this point 12 weeks before the earth reached the crossing. Instead of being presented with a sight of the comet, on the night of November 27, 1872, there occurred one of the most remarkable meteoric displays ever witnessed. The rain of shooting stars began at 7 o'clock in the evening and lasted until after midnight. It is estimated that fully 160,000 meteoric masses fell into the earth's atmosphere during the shower. They all came from a point in the sky near the bright star Gamma of the constellation Andromeda.

In 1885 there was another brilliant rain of "Bielids," so-called because their orbit has been identified with the orbit of the former comet of Biela. During the display of 1885 a fiery mass larger than the other shooting stars plunged with an explosion into the atmosphere. Unfortunately no one recorded its exact path. This fact prevents the complete identification of the meteoric mass which reached the ground at Mazapil, Mexico, from being with certainty claimed as a part of Biela's lost comet. But with reasonable assumption the Mazapil meteorite can be asserted to belong to the shower of Bielids. The mass when picked up weighed 8.7 pounds. It consists of iron and nickel in which are encrusted small masses of graphite.

Pure carbon exists in meteors in two natural forms, one of which is graphite and the other of which is the diamond. In some meteors very small diamonds are found. In the Mazipil meteorite the carbon is chiefly in the form of graphite. A fragment of the original mass weighing about two-tenths of a pound is kept in the Natural History Museum at New York city. It is strange indeed to realize that this small sheet of iron cut from the meteorite is perhaps a "clipping" nipped from Biela's comet. Think of being able to hold in one's hand a piece of sure-enough comet!

There is evidence that the return of a cometary wanderer to the domain of the sun brings about a disintegration of the mass. If the head, or nucleus of a comet, is composed of a swarm of rocks and chunks of metal widely separted from each other, but brilliantly incandescent with the sun's fires, it is reasonable to assume that continued repetitions of such violent conditions will eventually cause the comet to be dispelled into space. The material of the meteorites contains imprisoned gases which are quickly liberated under a slight increase of temperature. As a comet nears the sun its gases are set free. Particles are blown away by the pressure of sunlight. Electrical discharges also take place partly because of the presence of material subjected to the extremes of temperature. With all of these forces at work and with the attraction exerted by other bodies, by the planets and the sun, the life of a comet is to be measured by the frequency of its returns to perihelion. The short period comets are generally mere telescopic objects.

Biela's comet now is probably spread out over a great part of its orbit. It probably today consists merely of a vast conglomeration of debris—stony masses and masses of metallic materials. As time goes on and perturbation effects are produced upon this mass, changes in its condition result. Perhaps the earth will some day plunge through a thicker part of the ruins. If so, we shall again witness a magnificent display of shooting stars. Possibly a few large chunks of the ancient comet will reach the ground.

There is evidence that at least one great meteor, ages ago, came down from the sky and embedded itself into the soil. At Canyon Diablo, Arizona, there is to be seen a curious crater-like formation which has mystified scientists. The best explanation of it is the assumption that it was produced by a huge meteoric mass falling from the sky. As this great mass of metal plunged into the earth it generated steam in the moist soil and caused an explosion which turned upward the surrounding strata of rock. Fragments of meteoric iron fused with the native rock have been found. In this meteoric iron have been discovered the largest number of the microscopic diamonds characteristic of meteorites.

This fact has led to the drilling of a series of shafts in the bottom of the crater in an effort to reach the original meteoric mass. Several thousand feet have been probed into the earth without result. No meteorite has been found except the small fragments which exist on the surface.

If a large mass, one of several thousand feet diameter, should come into the atmosphere with the speed of the other Bielids, it would be a catastrophe. Traveling at 40 to 44 miles a second it would plunge into our atmospheric ocean with an effect of concussion that would reach around the world. In a wide radius every living thing would perish. Animal life could not withstand the concussion of so terrible an aerial depth bomb. We would perish like the fish in a pond when a stick of dynamite is exploded in it. Houses would be shaken down in distant cities. The explosion of Krakatoa in 1883 would be a mere nothing in comparison, yet the atmospheric waves of this volcanic explosion were felt around the world.

If a meteoric stone having about 3.5 the density of water and of about eight inches diameter plunges into the atmosphere at a velocity of 31 miles a second, the sudden heat developed amounts to 4,397,000 calories. At the height of less than 9.5 miles its speed would have been retarded to about half a mile a second. This is how the atmosphere saves us from the fury of these ordinary bullets and torpedoes from outside space.

THE RULE OF THREE--BY ETHEL TRAIN

(Continued From Page 3.)

beth said that? I wouldn't have believed it of her. I'm surprised at her. I'm ashamed."

"I offered it to Jim next," he told her.

"It would be Jim, of course," she acceded. "It never would be poor Peter."

"It's got to be Peter or nobody," he returned. "That's what's been bothering me. Mary won't budge any more than Elizabeth will. The only one of 'em that's willing to consider it at all is Ruth."

"Willing to consider it!" cried his wife, amazed. "As if it wouldn't be the most wonderful thing that could happen to any one! To move to Chicago and see all those great houses along the lake, and go to all those theaters and concerts, and," she ceased for lack of breath. Then, her eyes flashing:

"John, what's the matter with our girls?"

"The matter is that they're a bunch of molluscs," he returned bitterly. "They're satisfied."

"And you're not," she returned quickly. "That's the difference. Why don't you go yourself?"

"Do you really mean that?" he demanded.

"I should rather think I did mean it," she returned. "Why, it's the chance of a lifetime! If you don't see it, you're blind."

"I do see it," he cried. "I have seen it all along. It's only the thought of you that's been holding me back. I've been waiting all my life for the opportunity to get out of here, but I thought it had come too late."

"It's never too late," she retorted, her look full of fire, "unless you're dead."

"Janet!" he exclaimed in unfeigned admiration. "What a wonderful woman you are!"

"Pooh!" she retorted. "I'm not sacrificing anything. I'm just as crazy as you are to get away."

He caught her round the waist and they executed a few dance steps up and down the room.

Releasing her he asked suddenly:

"What'll the girls say?"

She tossed her head.

"They can say what they please," she said.

At this crucial moment they heard footsteps and voices outside.

"There they are now!" exclaimed Mrs. Farnam. "Wouldn't you know it? Come to say good-night, I suppose."

"Speak of angels—" muttered her husband, with unblushing banality.

He walked to the door and opened it.

"Back again?" he inquired blandly. "Well, well—come right in, all of you. Your mother has something to say."

"To us?" asked Elizabeth, puzzled. "Why, we've only just left her! What on earth can it be?"

Her mother's face was sparkling, her eyes were shining, the lamp light was playing upon her hair.

"Tell us your good news," urged Ruth.

"I'm going away," said Mrs. Farnam, eagerly. "We're moving to Chicago to open the new branch."

She could not have created more of a sensation if she had said Timbuctoo. They were thunderstruck.

Mary was the first to recover herself somewhat.

"It's out of the question," she declared. Then, piling one tautologized statement upon another in her excitement: "It's impossible. It can't be done."

"Why not?" her mother challenged her. "What's to prevent?"

"Any one of a thousand things!" Ruth cried. "In the first place, you'd have to leave your children behind."

"That's the best part of it," interposed her father, tartly, and the pith of this remark was accentuated by titters from behind three cigars. All the girls flushed resentfully.

"We didn't come here to be insulted," they declared.

"Don't pay any attention to him," soothed their mother. "You know I wouldn't leave you if you were little, even for one night. You forget that you're not children any more."

"We need you just as much," declared Mary.

"Not quite," her mother said thoughtfully.

"But what about your grandchildren?" urged Ruth. "They're little, aren't they?"

"That's different," her mother answered. "They have their own parents. I have no real responsibility toward them."

"There's your church," Mary reminded her. "You've always been so active in church work."

"There are churches in Chicago too," returned her mother mildly—"so I've heard."

"I can't imagine you," declared Elizabeth, "in any other home than this. To think of you deserting it, when we were all born here and all married from here and——"

"You didn't stay when something better offered," interrupted Mrs. Farnam. "Why should I?"

"What better could offer," her daughter demanded dramatically, "than to die where you've lived for so many years?"

"I'm not ready to die yet," retorted Mrs. Farnam.

"Not by a long shot," added her husband, with a dangerous glint in his eye.

"This is between ourselves and mother, father," Elizabeth objected.

At this he detached himself from the group and, stepping forward, said authoritatively:

"Not from now on. Here's where I come in. I've got something to say."

As all eyes turned upon him no one failed to be impressed by the earnestness of his tone. Standing in the midst of his family, he towered head and shoulders above them all. His bearing, his vitality and his height all contributed to make him an impressive and dignified old man whose words carried weight.

"Before you begin to talk about your mother's dying," he said, sweeping his three daughters with an inclusive and scornful glance, "you'd better give her a chance to live. She hasn't had that yet, you know, even if she is nearly 60 years old. In my opinion it's high time she did."

All three of the Farnam girls had paled at his implication. Ruth started to speak, but her father prevented her by a lift of his hand.

"Don't interrupt me," he continued. "It won't be my fault if you don't understand me clearly by the time I'm through. Ever since you were old enough to have any say at all you've been cramping your mother's style. She was just a mother to you—not a human being. You never saw her in any social relations; you've kept her so surrounded with yourselves that she never could make any friends. You've talked a lot about doing your duty, but half of your attention to your mother came from a desire to be pointed out as model daughters in the town. People fell for it, I admit; they didn't see in detail what that attention consisted in; how you dictated to her what she should do and read and wear; how you bored her to distraction, how shamelessly you intruded on our married life, robbing us of our time (a valuable commodity at our age) and of our privacy. It's appalling to think of those intolerable, wasted evenings, of the reading we might have done, the companionship we might have enjoyed!

"You always said you didn't want to neglect us—you never realized that we'd have given our eye teeth for a little judicious neglect! We stood all that—we'd have gone on standing it if you hadn't begun to talk about where your mother ought to die. That was a little too much. Supposing she were to give in to you and stay here. Instead of dying in her bed she might be knocked down by a trolley car tomorrow and draw her last breath in the drug store up the street. You won't understand that it isn't where you die that matters, nor even where you live, but how you live and whether you live at all."

Ruth had begun to cry.

"I'm beginning to understand," she sobbed.

"I am too," admitted Elizabeth.

"So am I. Thank you, father," said Mary.

Their father's glance softened. There was something in these girls after all.

"If you'll only stay," promised Ruth, "everything will be altogether different from now on."

Their mother stretched out her arms to them, just as she had when they were little girls.

"You be the one to tell us what to

(Concluded on Page 7.)