

TEARS OF ANDROMEDA: THE CELESTIAL SOLUTION TO AN EARTHLY MYSTERY

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The abandonment of the American merchant brigantine *Mary Celeste* in 1872 November remains the most celebrated unsolved mystery in maritime history. Found adrift and crewless in the North Atlantic with her cargo undisturbed and her ample provisions intact, *Mary Celeste* has resisted explanation for 150 years. Every theory advanced so far fails on one ground or another. Most require us to imagine that her captain, Benjamin Briggs, an experienced and highly regarded mariner, behaved irrationally or incompetently.

This paper solves the mystery and restores Captain Briggs's reputation. It identifies, for the first time, the singular essential clue concerning the most probable date of *Mary Celeste*'s abandonment. For a century and a half, investigators have overlooked the fact that an atmospheric phenomenon of stupendous scale was observed and documented worldwide on that exact same date. Drawing on modern scientific knowledge and reviewing the evidence in the light of this fact, the paper explains what may have happened to *Mary Celeste*.

'The game is afoot': A star-crossed encounter

On the morning of 1872 December 4, British brigantine *Dei Gratia* encountered a vessel behaving strangely some 600 miles west of Portugal. The slowly rotating mystery ship was *Mary Celeste*, an American merchant brigantine one month out of New York, bound for Genoa with a cargo of 1701 barrels of industrial alcohol.

Dei Gratia's captain, David Morehouse, knew *Mary Celeste*'s captain personally and was immediately alarmed. He sent a boarding party. What they found has puzzled the world ever since. *Mary Celeste* was intact and seaworthy. Her cargo, undisturbed. Food, water, and provisions were ample. The crew's personal belongings were there — clothing, pipes, the captain's pocket watch — but the ship was utterly deserted. Captain Benjamin Briggs, his wife Sarah, their two-year-old daughter Sophia, and seven crewmen had simply vanished without a trace. No bodies were ever found.²⁻⁵

The clues they left behind were maddeningly contradictory. The ship's one lifeboat was gone, and the marine chronometer and sextant were missing — suggesting deliberate, cautious preparation to leave. Yet personal valuables remained — suggesting sudden, urgent departure. A length of rope trailed in the water behind *Mary Celeste*, which to investigators meant only one thing: the lifeboat must have been tethered to the ship. The binnacle — the housing for the ship's compass — had been knocked from its mounting, compass glass shattered. Water had found its way throughout the ship; everything in the cabins was wet, the skylight open to the sea air.³ Yet she remained entirely seaworthy. The ship's log slate — the chalkboard on which Briggs made his navigational notations — showed *Mary Celeste*'s last recorded position as six nautical miles northeast of Saint Mary's Island in the Azores on November 25th. She was discovered one week later.⁶

Mary Celeste had drifted, crewless, for some number of the days in between. How many is not known precisely. But if she had continued eastward under sail for a day or two after pausing near Saint Mary's, and then drifted with the currents for about a week, that would

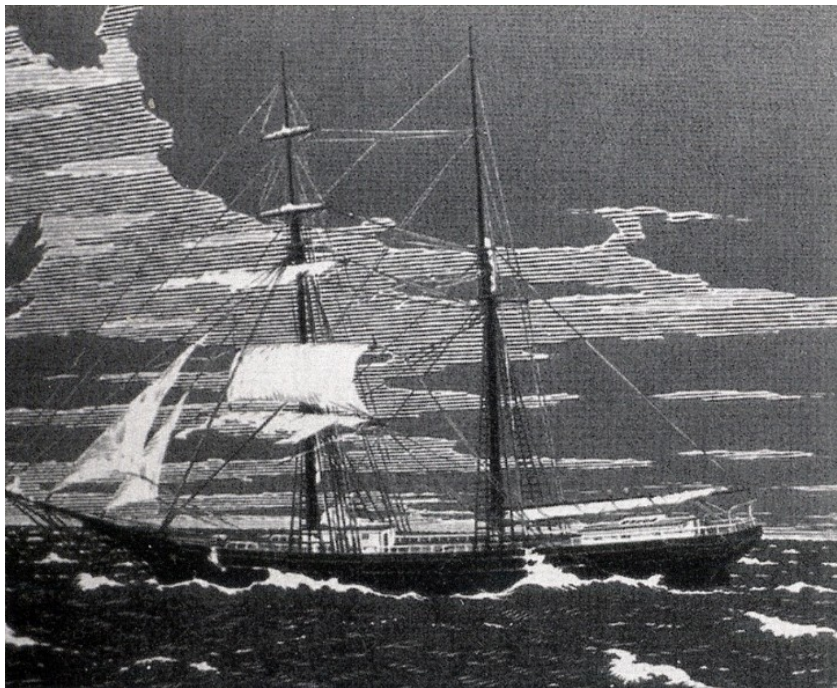


FIG. 1

An engraving of *Mary Celeste* as she was found abandoned. Artist unknown.

easily account for her position when she was spotted by Captain Morehouse.⁶ So, a tragedy may likely have occurred on or about the evening of 27 November. I ask you now to make careful note of that date: 1872 November 27. It is historically significant — and in a directly relevant way.

Every explanation that has been suggested — piracy, mutiny, waterspout, cargo explosion, insurance fraud — fails on one ground or another, and usually on several grounds. Most require us to imagine Captain Briggs behaving incompetently, even irrationally. That is an assumption his professional record does not support. He was experienced, respected, and devout — a man who by all accounts kept a steady head. He brought his wife and daughter aboard, which tells us something about his confidence in his own seamanship.

The question, then, is not merely what happened, but what on Earth could possibly have been terrifying enough to justify the captain's decision to abandon ship?

'When you have eliminated the impossible': The last extremity

No experienced mariner abandons a seaworthy ship for a small open boat in the Atlantic without overwhelming reason. A ship not sinking, a ship not engulfed in uncontrollable fire, a ship that is trim and navigable, is shelter, stability, and survival. The lifeboat is a last resort. Whatever drove Benjamin Briggs off *Mary Celeste* and into that small boat with his family and crew, it was something he judged to be far more dangerous than the expanse of ocean around them. On-board calamities would have been confronted and remedied on board. External threats such as typhoons or earthquakes would have been far more threatening

in a lifeboat.

There is only one circumstance in which abandoning such a seaworthy ship into a small open boat on a vast ocean becomes obviously the only rational choice — and that is if the seaworthy ship herself has become the target of an attack. What might an attack have looked like? Flashes in the darkness or fog. The crack and boom of naval guns. The splash of shot in the water nearby. And the terrible uncertainty. Is this aimed at us? Will the next salvo rupture the top deck or hull? Are we sitting on 1700 barrels of combustible cargo that is about to become our funeral pyre?

This is at first glance a very plausible scenario. The waters Captain Briggs was crossing were not without menace. Spain was in a civil war in 1872, and the routes sailed may well have served arms smugglers supplying one faction or another. A merchant brigantine running in the dark might conceivably have attracted the attention of vessels enforcing an arms blockade.

But the scenario fails for one insurmountable reason: no record of any such attack exists. No naval warship ever reported such an engagement. No government acknowledged one. At the lengthy and meticulous salvage hearings in Gibraltar, no whisper of a military explanation for *Mary Celeste*'s abandonment ever surfaced.³

And so, we are forced to look elsewhere. But if a naval attack is the one thing that would drive a competent captain to order his people off a seaworthy ship, and no such attack by human hands occurred, then we must ask: could there be some natural phenomenon that has, in every practical respect, the same impact on human observers? Does something natural replicate so precisely the flash, the concussion, the sustained thunder of naval gunfire as to be, for every purpose that mattered to Benjamin Briggs, indistinguishable from a naval attack?

Volcanism will not do. Briggs would have known of volcanoes, and he would not have thought for a moment that some distant reverberation or crimson glow imperilled his ship. A seaquake will not do either. There is simply no phenomenon known to occur on this Earth that produces such terrifying war-like flashes, blast, turbulence and prolonged, rolling cannonade. We are at an end. Or . . . are we? Perhaps the phenomenon we are looking for is *not of this Earth*.

'Whatever remains, however improbable, must be the truth': Fire from the heavens

Nearly five years before the fateful voyage of *Mary Celeste* — or, to be precise, at 7:00 pm local time on the evening of 1868 January 30 — residents of a quiet Polish village saw the sky suddenly aglow.⁷ Neighbours' houses, people thought, must be aflame. Then came the sound — a sustained, rolling thunder, like cannon fire, that went on and on, boom after boom, long after any single explosion should have faded into silence. People ran out into the streets. What was happening? Who was firing cannon? Where were the flames?

Then, stones fell. Thousands of them. Descending across the snow-covered countryside were tiny fragments of iron and rock from beyond the atmosphere, an estimated 68 780 of what have come to be known as 'Pultusk peas,' the largest number of meteorite fragments ever recorded.⁷⁻⁹ These were the shattered remnants of a meteoroid that had screamed through the sky and detonated in the air above Poland. Residents of Pultusk had witnessed what we now call a meteoric airburst. They had mistaken the flash for fire and the rolling echo, sonic booms, and secondary explosions for artillery. They simply had no other framework, no other word for what they were seeing, and no prior experience of anything like what they had witnessed.

Neither did anyone else in 1868. Nor, for that matter, in 1872.

But today, we know all about these phenomena. On 2013 February 15, a super bolide — a meteoroid estimated at twenty metres across and half a million tons — entered the skies over Chelyabinsk, Russia. Travelling at nearly 40 000 miles per hour, it did not reach the

ground. It slammed into the pressure built up by the lower atmosphere and exploded as if it had struck an impenetrable wall, at an altitude of about 18 miles. The explosion released energy equivalent to thirty times the force of the atomic bomb dropped on Hiroshima. The flash was brighter than the Sun. Windows shattered across six cities. Nearly 1500 people were injured, most by flying glass. The shockwave had arrived silently — travelling faster than sound — well before the roar of the thunderous detonation that rattled buildings across thousands of square miles.¹⁰

And Chelyabinsk was not even a large event by cosmic standards! In 1908 June, something far more powerful detonated above the remote Tunguska river basin in Siberia — flattening approximately 2000 square kilometres of forest, scorching trees for miles in every direction, and generating a shockwave felt hundreds of miles away. Eyewitnesses reported a blinding column of fire, searing heat, and a blast that knocked people from their feet. To this day, no impact crater has been found. Whatever it was, it never reached the ground.¹¹

Pultusk, Chelyabinsk, and Tunguska were visitors from outer space — meteoroids that entered our atmosphere without warning, without precedent in human records. All produced, in every practical respect, the flash, the concussion, and the sustained cannonade of war that no earthly natural phenomenon can replicate.

And another thing we know today that nobody could have imagined in 1872 is how frequently such events occur. Satellite monitoring in recent decades has revealed that meteoric airbursts of significant energy occur roughly thirty times each year, on average.^{12,13} The great majority pass entirely unnoticed over the vast oceans and uninhabited wilderness that cover most of our planet. But back in the 19th Century, the idea that even a single large extraterrestrial body, let alone many of them each year, could detonate in the atmosphere with the force of a naval bombardment and leave no trace was so far outside the experience of any investigator — maritime, legal, or scientific — that it simply could not occur to them to look for it.

But did such an airburst occur over the Atlantic Ocean east of the Azores in 1872 November? Let us now look more closely.

Andromeda's tears: The comet that died

I invite you now to travel back with me in time and place again — not to the North Atlantic in 1872, but much further back, in time, and very, very much further, in space — to meet a comet, and to understand what became of it.

In 1772, French astronomers Jacques Montaigne and Charles Messier independently discovered a faint smudge of light moving slowly against the stars. It was unremarkable at first, just one of many comets that were catalogued in that golden era of celestial inventory. It was later named for Wilhelm von Biela, an Austrian army officer who observed it in 1826 and was the first to recognize that it was a periodic visitor, one that returned to the inner Solar System every six-and-one-half years. Astronomers immediately began to look forward to its next appearance. It was, in the language of the observatory, a known quantity.^{14–16}

But it made astronomers uneasy. The comet's path was known to intersect Earth's path, and in 1832 that fact was enough to send the popular press into hysteria. Rumours flew that a world-ending collision was imminent. A Parisian play of the time featured a character announcing that the world was about to be turned to ashes. Astronomers calmly reassured the public that Earth and comet would miss each other that year by a full month.^{17,18} The paths did cross. But, at least for the return of 1832, the Earth was still safe.

However, in 1846, the known quantity did something quite unexpected, something no comet had ever before been observed to do. It split in two.^{14–16} It was now a pair of large observable chunks, quite unimaginatively designated 'Comet A' and 'Comet B.'

Astronomers watching through their telescopes that winter saw the pair of glowing fragments travelling side by side through space, like companions on a long journey. The couple



FIG. 2

Shower of Andromedids, 1872 November 27th, as observed over France. From Amedée Guillemin, *Le Ciel*, Paris, 1877.

returned together in 1852, just a little further apart and still visible. And then, they did not return at all. Neither fragment could be found on their predicted return in 1859 — an unfavourable year for observation in any case. The return of 1866 was eagerly anticipated and carefully watched from observatories across Europe. The sky was empty.^{14–16,19} Astronomers, with one exception, gave up in despair. Biela's Comet — both parts of it — had simply ceased to exist as a coherent body. It had, astronomers concluded, disintegrated into a vast dispersing cloud of fragments, dust, and debris stretching along its former orbital path. It took on the new official designation 3D/Biela — the 'D' standing for disappeared, the '3' marking it as only the third periodic comet ever identified. It was the first to vanish entirely.^{14–16}

What no one yet knew was where its debris had gone, or what would happen when the Earth crossed the path where Biela's Comet had once travelled.

Then, in the Fall of 1872, everyone found out.

The sky, as one contemporary observer described it, appeared to be on fire. From New York to London to Paris to Peking, astronomers and ordinary citizens alike stepped outside and stared upward in disbelief. Meteors — not dozens, not hundreds, but thousands upon thousands — streaked across the heavens in a display that defied description. Estimates of the rate varied wildly, but a renowned English astronomer, Edward Joseph Lowe, reported that 58 600 of these meteoric 'shooting stars' fell in under five hours at the storm's peak.²⁰ It was, and remains, one of the most spectacular and intense meteor storms ever recorded in human history — the dying signature of Biela's shattered comet, its dispersed remains burning up in Earth's atmosphere in a magnificent farewell.^{14–16,20}

The meteors of that night radiated from the direction of Andromeda, the constellation

named for the princess of Greek mythology who was sacrificially chained to a rock at the ocean's edge while the sea monster, Cetus, bore down upon her. Astronomers thus named the storm 'the Andromedids'. "Stars fell like rain"²⁰ was the way a contemporary Chinese scholar described the equally Olympian scale when the Andromedids returned as predicted in 1885.

Lovers of mythology might well have been deeply moved, seeing in that evening's streaks of fire the tears of Andromeda — or perhaps even the fury of Cetus. As for the astronomers, they were deeply moved as well, and equally as awestruck. And more, they were thrilled. They had long suspected meteor showers were associated with cometary debris — and now the Andromedids had solidified that theory beyond doubt. Papers were written. Journals filled. The event was meticulously documented around the globe.

Have you surmised the significance of the date that I asked you to take note of and remember? I said that it was a historically significant date. And so, it was. 1872 November 27, just two days after Captain Briggs' final log entry aboard *Mary Celeste*, was the very peak of the first great Andromedids meteor storm, the most spectacular display of celestial fireworks ever before witnessed in human history.

'Elementary': The solution

Meteor showers are not typically associated with airbursts or with meteorite falls. The luminous streaks that delight us are almost without exception vanishingly small fragments — grains of dust and grit shed by comets long since dead. They burn away completely high in the atmosphere.

But Biela's Comet was not long since dead. It was very recently alive, fully intact. No other comet in the history of human observation had ever been observed to break apart as Biela's did in the early 1840s. Its fragments were not ancient dust ground fine by millennia of solar radiation. They were substantial enough to be observed for years. The debris field that Earth sailed through on the night of 1872 November 27 was the wreckage of a comet that had been whole within living memory. Solid fragments capable of penetrating to the lower atmosphere were present in that stream and may still be out there even today.

On the deck of his merchant brigantine carrying 1701 barrels of industrial alcohol, Captain Benjamin Briggs would have watched the same sky as the enthralled observers in New York and in Paris. He had no scientific papers. No journals. No framework of understanding that might have told him what he was witnessing. He knew only what his senses reported — and what they reported, on that extraordinary night, was unlike anything his considerable maritime experience had prepared him for. The storm sent fragments deep enough into the atmosphere to produce sounds that may have seemed quite alarming to Briggs and to his crew. An English observer on land that same evening confirmed this as he carefully noted hearing what he described as distant gunshots, several times, to the north-west.²⁰ And so certain was the German astronomer Klinkerfues that Biela's debris had made contact with the Earth and still likely contained substantial fragments that within three days he telegraphed an observatory in Madras: "Biela touched Earth on 27th. Search near Theta Centauri."^{14-16,20} He was directing southern-hemisphere observers to search the sky for surviving segments of the shattered comet. No one connected his telegram to the empty, drifting hulk of *Mary Celeste*. No one could have. The two facts lay in separate worlds — the maritime and the astronomical — each waiting for the other.

Until now.

And so, here we are. I can now explain what may have happened.

The evening of 1872 November 27 began like any other at sea. *Mary Celeste* was making progress, her cargo secure, her crew at their stations. Captain Briggs had every reason to be satisfied. The Azores were behind him. Genoa lay ahead. The North Atlantic in late

November could be brutal, but Briggs had sailed worse waters in worse weather. He was, by all accounts, exactly where he wanted to be.

But that night the sky above *Mary Celeste* was alive with shooting stars — dozens, then hundreds of luminous trails streaking across the heavens in every direction. Briggs had seen meteor showers before, though nothing like this. And then, from somewhere to the south, came faint sounds like distant gunfire. How very odd. Briggs would have frowned. Gunfire? Fireworks? Heard way out here? How very, very odd.

Then the sky to the south began to brighten.

It was not the slow brightening of a distant ship's lantern, nor the familiar arc of a shooting star. This was something else — a growing, pulsing luminescence that turned the night sky the colour of dawn, then brighter than dawn, then brighter than anything Briggs or any man aboard had ever seen. There was no sound. Not yet. Only light — savage, sourceless light, filling the sky.

Then came the heat wave. Blistering heat. Were they to burn alive? There was only a split second of such terror before their world came apart.

The pressure shockwave then struck *Mary Celeste* silently. The wall of compressed air moving faster than sound lifted the ship, heeled her savagely, and swept the deck with a torrent of white water drenching every cabin, every corner, every crevice below. Men were thrown from their feet. The binnacle — that sturdy, familiar housing of the ship's compass — was knocked from its mounting and crashed to the deck, glass shattered, compass ruined. Sails tore at their lashings. Lines ran free.

And then — silence again! A few seconds of terrible, ringing silence.

And, at last, the sound came. It came at them from everywhere and nowhere — a rolling, concussive thunder unlike anything produced by storm or sea or any natural force they had ever encountered. Not one explosion but many, boom following boom following boom, like the broadside of a man-of-war, then another, then another, going on and on and on in a sustained cannonade that simply refused to end. The night sky above was alive with streaking fire — hundreds, thousands of luminous trails burning across the heavens in every direction, the dying fragments of a comet that had begun to break apart 30 years before, millions of miles away.

Benjamin Briggs did not know about comets. He knew only what his senses told him.

His ship had been struck by something of incomprehensible violence. His compass was destroyed. Beneath his feet lay 1701 barrels of industrial alcohol. Whatever monstrous power had just hit them was still happening — the booming went on, and on, and the sky continued to burn. Was his ship a target? Would another blow rupture the hull? Would his cargo ignite?

He made his decision. It was the decision any competent, rational, experienced captain would have made with the information available to him in that moment. He ordered his family and crew into the lifeboat. He ordered a line made fast between the boat and the ship — he was not abandoning *Mary Celeste*, not yet, not permanently. He was buying distance. He was keeping his people alive until whatever was happening had passed, and then he would go back aboard.

The crew worked fast and efficiently — not in panic, but with the focussed urgency of trained sailors following a captain they trusted. The lifeboat was freed. The tether was secured. Briggs helped his wife and his two-year-old daughter into the boat. The crew followed. They pushed off from the hull of *Mary Celeste* and rowed clear, watching her, waiting.

We will never know how long they waited. We will never know what they said to one another in that small boat on that enormous sea, or what Sarah Briggs thought as she held her daughter and watched the sky burn. We know only that at some point — in a swell, in the darkness, in the confusion of that impossible night — the tether line parted.

And *Mary Celeste* sailed on without them.

She was found nine days later, crewless and intact, drifting in the light of a cold December morning — her cargo undisturbed, her provisions untouched, her log-slate carrying its last notation in a doomed man's hand.

Benjamin Briggs had not panicked. He had not lost his mind. He had not conspired in any crime, nor suffered any mutiny, nor made any foolish error. He had done exactly what any sane, sober, experienced captain would have done.

Unavoidable though it was, he had simply made the wrong choice.

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REVIEWS

Out of This World, by Peter Bond (Reaktion), 2026. Pp. 376, 24.5 × 16.5 cm. Price £25 (hardbound; ISBN 978 1 83639 199 9).

Is there a need for another book about humans' adventures in space? As the author Peter Bond recognizes in the acknowledgements, many books have been written about the Space Age, and indeed as he says those have provided much of the background information for this book. Bond's book is a bit different: although it covers much of the same ground as many others, it deals with the subject matter thematically rather than directly historically as is usual. In nine readable chapters, he deals with the particular issues and concerns that must be answered in order to enable humans to live and work in space.