

1

00:00:00,000 --> 00:00:08,400

Do the sounds of the ocean hold the key to the biggest aviation mystery of modern times?

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00:00:08,400 --> 00:00:11,400

If the aeroplanes there, they'll find it.

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00:00:11,400 --> 00:00:16,600

What's behind the discovery of a bizarre body on the high seas?

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00:00:16,600 --> 00:00:21,000

How can a man be mummified on a boat drifting in the middle of the ocean?

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00:00:22,000 --> 00:00:28,400

And is a ghostly entity appearing to adventurers in extreme peril?

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00:00:28,800 --> 00:00:31,400

Is it magic? Is it faith? What is it?

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00:00:34,400 --> 00:00:39,400

The underwater realm is another dimension.

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00:00:39,400 --> 00:00:48,400

It's a physically hostile place where dreams of promise can sink into darkness.

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00:00:48,400 --> 00:00:50,400

I'm Jeremy Wade.

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00:00:50,400 --> 00:00:57,400

I'm searching the world to bring you the most iconic and baffling underwater mysteries known to science.

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00:00:57,400 --> 00:01:00,400

Shipwrecks can't just disappear, or can they?

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00:01:00,400 --> 00:01:04,400

It's a dangerous unexplored frontier that swallows evidence.

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00:01:04,400 --> 00:01:08,400

We know more about the face of Mars than we do our deepest oceans.

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00:01:08,400 --> 00:01:13,400

Where unknown is normal and understanding is rare.

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00:01:13,400 --> 00:01:33,400

On March 8th, 2014, Malaysia Airlines Flight 370 departs Kuala Lumpur with 239 passengers

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00:01:33,400 --> 00:01:37,400

and crew bound for Beijing, China.

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00:01:37,400 --> 00:01:39,400

It never arrives.

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00:01:39,400 --> 00:01:45,400

Years later, the fate of MH370 remains a mystery.

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00:01:45,400 --> 00:01:51,400

But now, pioneering science involving a new way of listening to the ocean

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00:01:51,400 --> 00:01:54,400

offers to unlock the location of the missing aircraft

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00:01:54,400 --> 00:01:59,400

and solve the greatest aviation mystery of modern times.

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00:01:59,400 --> 00:02:09,400

Malaysia Flight 370 contacts the Chinese Air Force 0-9.

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00:02:09,400 --> 00:02:12,400

Malaysia Flight 370.

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00:02:14,400 --> 00:02:18,400

They communicated to Indonesian air traffic control.

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00:02:18,400 --> 00:02:23,400

It was supposed to be handed off to Vietnamese aircraft control, and it just disappeared.

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00:02:23,400 --> 00:02:28,400

A real vexing part of this mystery is that the pilot says good night,

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00:02:28,400 --> 00:02:32,400

but then the plane turns off course.

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00:02:32,400 --> 00:02:38,400

The transponder then gets switched off, and then the aircraft, MH370,

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00:02:38,400 --> 00:02:42,400

flies along scenes of radar lines outside of radar coverage.

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00:02:42,400 --> 00:02:44,400

There's no distress call.

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00:02:44,400 --> 00:02:47,400

There are no calls from cell phones, from the passengers.

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00:02:47,400 --> 00:02:50,400

Just complete silence.

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00:02:50,400 --> 00:02:55,400

What happened to the flight has haunted the world ever since.

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00:02:55,400 --> 00:02:58,400

We're not used to planes just disappearing.

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00:02:58,400 --> 00:03:03,400

If they come down, we expect to be able to find out why.

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00:03:03,400 --> 00:03:08,400

An international team of reconnaissance aircraft with naval support

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00:03:08,400 --> 00:03:12,400

combs the vast Indian Ocean for signs of the plane.

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00:03:16,400 --> 00:03:19,400

Analysis of satellite data and drift modelling

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00:03:19,400 --> 00:03:25,400

identifies an area of the Indian Ocean that searches dub the Seventh Ark.

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00:03:25,400 --> 00:03:31,400

The Seventh Ark is determined by the experts to be the maximum distance a plane could have reached

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00:03:31,400 --> 00:03:34,400

dependent on the fuel that was in the plane.

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00:03:34,400 --> 00:03:41,400

Experts narrow down the hunt to a section of the Ark, 2,000 miles off the coast of Western Australia.

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00:03:44,400 --> 00:03:47,400

But the search team faces huge challenges.

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00:03:47,400 --> 00:03:52,400

The average depth of the Indian Ocean is over 12,000 feet.

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00:03:52,400 --> 00:03:55,400

The deep ocean is truly the abyss.

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00:03:55,400 --> 00:04:01,400

We often think of the land as being mountainous, but that compared to the ocean is a smooth pebble.

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00:04:04,400 --> 00:04:08,400

And although satellites and radar can aid in the search from above,

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00:04:08,400 --> 00:04:11,400

they can't penetrate the deep ocean.

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00:04:11,400 --> 00:04:15,400

Anything deeper than 200 metres is very poorly explored.

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00:04:15,400 --> 00:04:18,400

It's hard to get to and there's no light down there.

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00:04:18,400 --> 00:04:22,400

We don't have accurate maps of the seabed in that area.

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00:04:22,400 --> 00:04:27,400

Unable to see in the dark waters, the search team adopts a different method.

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00:04:27,400 --> 00:04:35,400

Once you start to look below the surface, really sound is the best tool that we have.

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00:04:35,400 --> 00:04:42,400

So we have to convert that sound search into a visual picture

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00:04:42,400 --> 00:04:45,400

and that's effectively what Sonar is doing.

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00:04:45,400 --> 00:04:52,400

We call it mowing the lawn and you just have to work those transits back and forth, back and forth, back and forth until you find something.

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00:04:52,400 --> 00:05:00,400

Autonomous and remotely operated vehicles sweep the ocean floor with Sonar looking for the stricken plane.

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00:05:00,400 --> 00:05:06,400

They allow you to get deep enough for long enough to map the seafloor at incredible depths.

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00:05:06,400 --> 00:05:13,400

The team combs an area of 46,000 square miles, but nothing is found.

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00:05:19,400 --> 00:05:24,400

For over a thousand days, the Australians have been looking in different locations.

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00:05:24,400 --> 00:05:30,400

And I mean, it's an airplane. I never thought that it wasn't found yet.

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00:05:30,400 --> 00:05:38,400

Dr Usama Kadri, a mathematician and expert in fluid dynamics, is frustrated by the lack of progress.

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00:05:38,400 --> 00:05:40,400

But he has an idea.

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00:05:40,400 --> 00:05:50,400

If MS-870 would have impacted on the surface, I started thinking, would actually that create acoustic gravity waves.

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00:05:50,400 --> 00:05:56,400

When an object hits the sea's surface, it causes a sudden change in water pressure,

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00:05:57,400 --> 00:06:03,400

which creates a special type of sound wave called an acoustic gravity wave.

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00:06:03,400 --> 00:06:07,400

They don't only reside at the surface, they reside everywhere.

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00:06:07,400 --> 00:06:11,400

We're talking about 4,000 metres, the average depth of the ocean.

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00:06:11,400 --> 00:06:17,400

In addition, acoustic gravity waves can travel many hundreds of miles.

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00:06:17,400 --> 00:06:24,400

By tracking these waves, it should be possible to work out the time an object struck the water.

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00:06:24,400 --> 00:06:28,400

And potentially its location in the ocean.

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00:06:28,400 --> 00:06:38,400

So, could an acoustic gravity wave caused by the impact of MH-370 unlock the secret of its final resting place?

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00:06:38,400 --> 00:06:47,400

If MS-870 impacted on the surface of the ocean, that impact should have been recorded.

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00:06:47,400 --> 00:06:52,400

Do we have some underwater recordings for these waves?

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00:06:53,400 --> 00:06:59,400

Across the planet's ocean floor lie listening posts called hydrophones.

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00:06:59,400 --> 00:07:06,400

These underwater microphones convert sounds in the ocean into electrical signals that can be measured.

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00:07:06,400 --> 00:07:13,400

They're used from everything from tracking whales to tracking submarines.

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00:07:13,400 --> 00:07:20,400

So did hydrophones record an acoustic gravity wave made by MH-370 when it hit the water?

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00:07:20,400 --> 00:07:27,400

Hydrophones are incredibly sensitive, so something impacts the surface a thousand miles away, it will still be heard.

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00:07:27,400 --> 00:07:31,400

And there's an international organisation that's listening.

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00:07:31,400 --> 00:07:40,400

The CTBTO, the Nuclear Test Ban Treaty Organisation, operates hydrophone stations around the world.

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00:07:40,400 --> 00:07:47,400

Listening out 24-7 for evidence of unsanctioned nuclear weapons testing.

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00:07:51,400 --> 00:07:58,400

Dr Kadri's hope is that they may have inadvertently captured the impact of MH-370.

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00:07:58,400 --> 00:08:06,400

I asked to have all available data in the Indian Ocean that they have from hydrophones that might be related to MH-370.

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00:08:06,400 --> 00:08:14,400

From before the airplane took off until the very possible time that you can have on that flight.

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00:08:14,400 --> 00:08:23,400

One listening station sits at Cape Lulin on the southwest tip of Australia, close to the original search site.

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00:08:23,400 --> 00:08:28,400

We focused on the ones from Cape Lulin which is nearer to the 7th arc.

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00:08:28,400 --> 00:08:35,400

There were two signals that could have been related to MH-370.

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00:08:35,400 --> 00:08:40,400

Frustratingly, the signals he finds are very weak.

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00:08:40,400 --> 00:08:49,400

But there's another CTBTO station in the Indian Ocean whose signals have not yet been investigated.

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00:08:49,400 --> 00:08:59,400

This is over 3,000 miles away to the northwest on the tiny and remote militarised island of Diego Garcia.

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00:08:59,400 --> 00:09:04,400

If you blindly trusted 7th arc, then you wouldn't even look there at this data.

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00:09:04,400 --> 00:09:12,400

Is this really going to be a way that we can turn back the clock to the origin of the MH-370's loss at sea?

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00:09:12,400 --> 00:09:23,400

It is a long shot, but Dr Kadri believes that hydrophone recordings from Diego Garcia could help pinpoint the impact of MH-370 in the ocean

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00:09:23,400 --> 00:09:30,400

and thereby be the key that opens up the investigation into the missing aircraft.

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00:09:30,400 --> 00:09:36,400

But when he gets his hands on the recordings, vital data is missing.

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00:09:36,400 --> 00:10:05,400

The disappearance of flight MH-370 has baffled the world for years, but now a radical new technique that hunts sound waves underwater

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00:10:05,400 --> 00:10:11,400

could pinpoint the aircraft's impact site in the ocean.

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00:10:11,400 --> 00:10:20,400

The initial search for MH-370 in the South Indian Ocean has been the largest and most expensive in history.

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00:10:20,400 --> 00:10:32,400

Millions and millions of dollars have been spent, thousands and thousands and thousands of hours of vessels doing survey in the Indian Ocean.

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00:10:32,400 --> 00:10:38,400

But what if they've been looking in the wrong place?

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00:10:38,400 --> 00:10:49,400

Now, a new theory is pointing to a different area, 3,000 miles away, where underwater recordings could hold the key to the mystery.

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00:10:49,400 --> 00:10:59,400

They couldn't find the airplane in the very same place that they thought that it should be, so I really wanted to analyse all the signals.

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00:10:59,400 --> 00:11:09,400

But when Dr. Cardre finally gets his hands on the relevant recording data from the Diego Garcia listening station, crucial information is missing.

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00:11:09,400 --> 00:11:19,400

When we got the data, for each hour you get one file. You notice that was one file that has half of the size.

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00:11:19,400 --> 00:11:28,400

There's a 25-minute hole in the recordings and it's vital data from right around the time that the plane disappeared.

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00:11:28,400 --> 00:11:35,400

All these three hydrophones, it seems that they were shut down at the same time.

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00:11:35,400 --> 00:11:42,400

The reason that we believe it's shut down because of the way the signal looks like when it restarts.

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00:11:42,400 --> 00:11:48,400

We wanted to know why there is a missing 25 minutes.

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00:11:48,400 --> 00:11:55,400

Was the hydrophone turned off due to some type of technical issue that was anticipated?

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00:11:56,400 --> 00:12:03,400

The missing data has opened up a further mystery and yet more speculation.

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00:12:03,400 --> 00:12:07,400

Would there be the threat of a rogue nation intercepting data?

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00:12:07,400 --> 00:12:15,400

Could it have been interference from other states who for their own reason are finding ways to switch off the hydrophones?

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00:12:15,400 --> 00:12:21,400

Requests from Dr. Cardre's team for answers are met with silence.

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00:12:21,400 --> 00:12:32,400

The missing 25 minutes is absolutely vital because if we had those 25 minutes then we would actually know almost certainly whether we're talking about MH370.

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00:12:32,400 --> 00:12:44,400

Undeterred by this unforeseen setback, Dr. Cardre digs into the remaining data from Diego Garcia and finds something astonishing buried deep inside the recordings.

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00:12:44,400 --> 00:12:50,400

From Diego Garcia, there are a couple of signals that were found.

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00:12:50,400 --> 00:12:55,400

One of these mysterious signals could be the impact of MH370.

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00:12:55,400 --> 00:13:08,400

If it is, it means the plane took a route no one has yet examined and it could launch a brand new investigation into what really happened in the final hours of the ill-fated flight.

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00:13:08,400 --> 00:13:13,400

Usama Cardre and his colleagues are giving us a new perspective on this mystery.

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00:13:13,400 --> 00:13:17,400

If the aeroplane is there, they'll find it.

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00:13:17,400 --> 00:13:23,400

Much detailed data analysis remains to be done by Dr. Cardre and his team.

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00:13:23,400 --> 00:13:39,400

But in time his investigations could trigger a new search in a brand new area, bringing fresh hope to the families of the missing and perhaps finally solving this terrible tragedy, one of the most enduring mysteries of the deep.

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00:13:39,400 --> 00:13:52,400

What is the disturbing secret beneath the decks of a stricken boat drifting in the middle of the ocean?

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00:13:52,400 --> 00:13:56,400

He was literally mummified, basically turned to leather.

126

00:13:56,400 --> 00:14:02,400

What happened here? What happened to the captain? What happened to the vessel?

127

00:14:10,400 --> 00:14:27,400

My investigations on and under the water have brought me face to face with the bizarre, the unexplained and the downright horrific.

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00:14:27,400 --> 00:14:37,400

But just when you think you've seen it all, the waters throw up an even more disturbing phenomenon, a mummified man in the middle of the ocean.

129

00:14:44,400 --> 00:14:47,400

January 31st, 2016.

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00:14:47,400 --> 00:14:56,400

The clipper around the world yacht race is in full flow through the western Pacific on its fifth leg from Australia to Vietnam.

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00:14:56,400 --> 00:15:00,400

Leading the pack is the Elmax Exchange.

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00:15:00,400 --> 00:15:08,400

500 nautical miles west of Guam, they come across a disconcerting site.

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00:15:08,400 --> 00:15:11,400

They find a stricken vessel with a broken mast.

134

00:15:11,400 --> 00:15:16,400

There's a code of the sea that says you don't leave your fellow mariner in peril.

135

00:15:16,400 --> 00:15:21,400

They went over to see if the vessel was in distress, nobody came out.

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00:15:21,400 --> 00:15:27,400

The ocean is always moving and so it's impossible for them to really pull up alongside each other.

137

00:15:27,400 --> 00:15:35,400

So it was necessary for the crew of the race boat to pull up nearby and send someone to swim across.

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00:15:35,400 --> 00:15:42,400

The crew member manages to battle his way to the stricken yacht and clamber aboard.

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00:15:42,400 --> 00:15:44,400

What he found was horrific.

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00:15:45,400 --> 00:15:51,400

A dead sailor slumped over his charts, seemingly frozen in time.

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00:15:51,400 --> 00:15:57,400

I can't imagine climbing aboard a vessel to offer assistance and finding a dead person on board.

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00:15:57,400 --> 00:16:00,400

It must have been horrifying.

143

00:16:00,400 --> 00:16:04,400

How long has he been sitting there dead?

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00:16:04,400 --> 00:16:08,400

How did he die? Was it foul play? Was he injured?

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00:16:08,400 --> 00:16:14,400

One thing that's really eerie is that you look at the way that he's frozen the position, he's slumped over the table.

146

00:16:14,400 --> 00:16:20,400

He may have known he was having some kind of medical issue going for the radio to say SOS help.

147

00:16:20,400 --> 00:16:29,400

There's no sign of a struggle or injury and certain obvious clues that would be available on land are missing.

148

00:16:30,400 --> 00:16:41,400

Often the first things to arrive at a dead body will be flies and their maggots can actually give us a timeline for how long that body's been dead.

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00:16:41,400 --> 00:16:46,400

But in this case we don't have that. Out in the middle of the ocean there aren't any flies.

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00:16:46,400 --> 00:16:51,400

The race crew called the Coast Guard. The Coast Guard said they'll take care of the issue.

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00:16:51,400 --> 00:16:54,400

Basically race on, we've got this.

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00:16:54,400 --> 00:17:01,400

The racing yacht continues on her way but no one comes to deal with the stricken vessel.

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00:17:01,400 --> 00:17:07,400

Fast forward 26 days, 600 miles away near the Philippines.

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00:17:07,400 --> 00:17:12,400

A group of fishermen come across the very same boat.

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00:17:12,400 --> 00:17:17,400

The gentleman who was in it, who expired, was still at his same position.

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00:17:17,400 --> 00:17:26,400

It's unbelievable that he was drifting for so long and so far how he wasn't picked up by the authorities, no one knows.

157

00:17:26,400 --> 00:17:30,400

And something bizarre has happened to him since he was last seen.

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00:17:30,400 --> 00:17:38,400

This is where the mystery really begins because they find him at the table, slumped over, but he looks like a mummy.

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00:17:41,400 --> 00:17:45,400

He was literally mummified, basically turned to leather.

160

00:17:45,400 --> 00:17:51,400

What happened here? What happened to the captain? What happened to the vessel?

161

00:17:51,400 --> 00:17:57,400

The mummified sailor is brought ashore and the local police start searching for clues.

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00:17:57,400 --> 00:18:01,400

A few new pieces of information come to light.

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00:18:01,400 --> 00:18:05,400

This yachtsman was very, very experienced. He'd gone all over the world.

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00:18:05,400 --> 00:18:12,400

He'd been sailing from 2008 almost continuously, first with his wife and then on his own.

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00:18:12,400 --> 00:18:17,400

The autopsy concludes that the most likely cause of death was a heart attack.

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00:18:17,400 --> 00:18:25,400

But it can't explain how the body has completely dried out, just three feet from a vast expanse of water.

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00:18:25,400 --> 00:18:33,400

The fact that he was found in this sort of mummified state is a pretty curious thing.

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00:18:33,400 --> 00:18:37,400

When we think of mummification, we of course think of Egypt.

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00:18:38,400 --> 00:18:45,400

Ceremonial mummification was practiced in Egypt and parts of America and Asia for thousands of years.

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00:18:45,400 --> 00:18:55,400

To prepare a dead body for the afterlife, internal organs and all liquid were removed to prevent rotting and aid preservation.

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00:18:55,400 --> 00:18:59,400

So by removing a lot of these internal organs, you're also removing the moisture.

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00:18:59,400 --> 00:19:06,400

That was one of the ways that they tried to slow down the decomposition process and promote the mummification.

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00:19:07,400 --> 00:19:15,400

This process took months and involved surgery, elaborate ritual and a wide range of minerals and ointments.

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00:19:15,400 --> 00:19:19,400

And it was carried out in the driest places on the planet.

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00:19:19,400 --> 00:19:26,400

So what miracle created this modern day mummy in the middle of the ocean in just 26 days?

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00:19:26,400 --> 00:19:31,400

This hasn't been observed before, so it's something quite new and quite mysterious.

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00:19:32,400 --> 00:19:37,400

How did it happen? And how did it happen so fast?

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00:19:52,400 --> 00:19:56,400

A lone sailor has naturally mummified in the middle of the ocean.

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00:19:56,400 --> 00:20:03,400

All we know is that he died of a heart attack and this shocking transformation happened within a month.

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00:20:03,400 --> 00:20:11,400

How on earth can a process which normally takes twice that time with assistance happen in the middle of the ocean on its own?

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00:20:14,400 --> 00:20:19,400

What kind of conditions must have been present on this vessel in order for him to become mummified?

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00:20:20,400 --> 00:20:27,400

On land, natural mummification can occur in extremely cold or arid environments,

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00:20:27,400 --> 00:20:34,400

or when a body is deprived of oxygen. Famous examples have been found around the globe.

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00:20:34,400 --> 00:20:38,400

There's an ice man basically preserved within the ice.

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00:20:39,400 --> 00:20:49,400

For over 5,000 years, Otsi the Iceman lay in snow and ice in the Tyrol mountains of Italy, where his body slowly dehydrated.

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00:20:49,400 --> 00:20:52,400

Or there's people who sink down into bogs.

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00:20:53,400 --> 00:20:58,400

The Tolland man was found buried in Peat near Silkeborg in Denmark.

188

00:20:58,400 --> 00:21:05,400

His head startlingly well preserved after more than 2,000 years in an oxygen-deprived bog.

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00:21:06,400 --> 00:21:13,400

But few examples exist of mummification happening naturally when surrounded by the ocean.

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00:21:13,400 --> 00:21:16,400

There's sort of a preservation process happening.

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00:21:16,400 --> 00:21:24,400

So you need to have a situation where insects and things that you normally have on land that would promote decomposition aren't actually there.

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00:21:25,400 --> 00:21:29,400

But there are other, much more powerful factors at play.

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00:21:30,400 --> 00:21:36,400

The mummification process here was likely a combination of the heat and the wind.

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00:21:37,400 --> 00:21:42,400

We know that the yacht would have been quite warm, and we also know that there was a hatch left open,

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00:21:42,400 --> 00:21:45,400

and there would have been a bit of a breeze coming through the ship.

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00:21:45,400 --> 00:21:52,400

If you have a contained space that's being heated up by the sun, that can become incredibly hot and powerful,

197

00:21:52,400 --> 00:21:59,400

with air continually flowing through, warming up and dehydrating this body over time.

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00:21:59,400 --> 00:22:05,400

In addition to heat and wind, experts speculate that another element might be a factor,

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00:22:05,400 --> 00:22:09,400

and it's something found in abundance in the sea.

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00:22:09,400 --> 00:22:14,400

The Egyptians would use natron, which was a form of salt that would be used to preserve the body.

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00:22:14,400 --> 00:22:16,400

He was in a salty environment.

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00:22:16,400 --> 00:22:23,400

If you're bathing, usually you're bathing with salt, so it's entirely possible that he had salt on his skin.

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00:22:23,400 --> 00:22:27,400

And perhaps the sea salts behaved like the natron in this case.

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00:22:28,400 --> 00:22:37,400

But for their mummification process, the ancient Egyptians would cover the corpse with large quantities of natron.

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00:22:37,400 --> 00:22:43,400

So could a much smaller quantity of sea salt have had the same effect?

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00:22:43,400 --> 00:22:47,400

And one other vital question still remains.

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00:22:47,400 --> 00:22:51,400

How could this transformation happen in just 26 days?

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00:22:51,400 --> 00:22:56,400

Less than half the time it took the ancient Egyptians.

209

00:22:56,400 --> 00:23:01,400

In just the right conditions, mummification can happen quite quickly.

210

00:23:01,400 --> 00:23:05,400

Something that they refer to as precocious mummification.

211

00:23:05,400 --> 00:23:13,400

Precocious mummification has been observed to occur in confined spaces and specific microclimates.

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00:23:13,400 --> 00:23:17,400

Maybe it was a perfect storm of conditions.

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00:23:17,400 --> 00:23:29,400

But exactly how a process that naturally can take a year and with assistance several months can happen in weeks and at sea is still unclear.

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00:23:29,400 --> 00:23:34,400

It's a mystery as to why that happened over the period of time that it did.

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00:23:36,400 --> 00:23:47,400

The ocean usually swallows its victims without a trace, but this one is preserved for the annals of science by a process that may never be fully understood.

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00:23:48,400 --> 00:24:05,400

Many of our greatest cities were born out of the ocean, ports providing safe haven from storms, enemies and deep sea creatures.

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00:24:05,400 --> 00:24:10,400

San Francisco has always been faced by an additional threat.

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00:24:10,400 --> 00:24:12,400

Earthquakes.

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00:24:12,400 --> 00:24:23,400

Now an amazing discovery of ships underground may mean that the city's nautical past could threaten its future when the next big one strikes.

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00:24:31,400 --> 00:24:34,400

Down below there's something hidden.

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00:24:34,400 --> 00:24:37,400

I think the people wouldn't believe it.

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00:24:37,400 --> 00:24:45,400

In 1978, workmen digging foundations in downtown San Francisco make a remarkable discovery.

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00:24:45,400 --> 00:24:49,400

And it's the first of many.

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00:24:49,400 --> 00:24:58,400

When construction workers are digging tunnels for the metro or foundations for large buildings, they're constantly finding the remains of ships.

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00:24:58,400 --> 00:25:04,400

Over 60 shipwrecks are known to be in the harbor area or the downtown business corps.

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00:25:04,400 --> 00:25:07,400

But where have these ships come from?

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00:25:07,400 --> 00:25:13,400

You're finding razor blades, you're finding bottles, you're finding all kinds of goods that these people were taking with them.

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00:25:13,400 --> 00:25:17,400

Is this an ancient shipyard? Is this a burial ground?

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00:25:17,400 --> 00:25:22,400

It's like, holy cow, how'd this ship get three blocks from the sea?

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00:25:22,400 --> 00:25:28,400

San Francisco is not the only coastal city where this phenomenon has come to light.

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00:25:29,400 --> 00:25:34,400

It's happening in cities like New York, for example, when they rebuilt the Twin Tower.

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00:25:34,400 --> 00:25:37,400

They actually found a shipwreck at the bottom of the new site.

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00:25:37,400 --> 00:25:41,400

The same thing has been found in Istanbul and in places all around the world.

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00:25:41,400 --> 00:25:45,400

What is unique about San Francisco is you have so many.

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00:25:45,400 --> 00:25:51,400

It's really one of the largest collections of shipwrecks that have survived in a land context.

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00:25:51,400 --> 00:25:57,400

The more ships archaeologists find, the more they notice a strange connection.

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00:25:57,400 --> 00:26:03,400

They are all from the same era, 170 years ago.

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00:26:03,400 --> 00:26:10,400

So what happened in the mid-19th century that created this extraordinary ship cemetery?

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00:26:10,400 --> 00:26:15,400

The answer is gold.

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00:26:16,400 --> 00:26:19,400

January 24, 1848.

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00:26:19,400 --> 00:26:23,400

Flakes of gold are discovered at Caloma, California.

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00:26:23,400 --> 00:26:30,400

San Francisco is the nearest port for thousands of wannabe prospectors.

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00:26:30,400 --> 00:26:36,400

The population of San Francisco exploded from 1,000 people to 25,000 people.

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00:26:36,400 --> 00:26:43,400

People were coming from all over the world, so you had this river of men flowing in from the ocean.

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00:26:43,400 --> 00:26:46,400

It was like a huge parking problem.

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00:26:46,400 --> 00:26:52,400

The desire for gold is so strong that the new arrivals, including many crews,

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00:26:52,400 --> 00:26:58,400

desert their ships and head straight for the gold fields.

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00:26:58,400 --> 00:27:04,400

I think at one point there are over 900 vessels just abandoned in San Francisco Harbor.

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00:27:04,400 --> 00:27:10,400

It must have looked like hundreds of trees without any limbs.

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00:27:10,400 --> 00:27:14,400

But how do they end up creating new land?

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00:27:14,400 --> 00:27:19,400

Scuttling ships is the purposeful sinking of vessels.

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00:27:19,400 --> 00:27:23,400

Often they're filled with rocks or they're filled with sediment,

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00:27:23,400 --> 00:27:28,400

or they have big piles driven through them in order to keep them in place.

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00:27:28,400 --> 00:27:33,400

They started to fill the in-between spaces in with refuse and dirt and all kinds of things

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00:27:33,400 --> 00:27:39,400

to basically fill in the area around and in between the ships to make land.

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00:27:39,400 --> 00:27:44,400

Starting from shore they would just accrete out another vessel, another vessel, another vessel.

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00:27:44,400 --> 00:27:53,400

And thanks to a loophole in San Francisco Law, if you sank a ship you could claim it as land.

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00:27:53,400 --> 00:27:59,400

And boom, you own a piece of waterfront property in San Francisco.

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00:27:59,400 --> 00:28:05,400

170 years later, these boats are now the skeletons of the city's past

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00:28:05,400 --> 00:28:09,400

and the foundations of a 21st century gold rush.

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00:28:09,400 --> 00:28:15,400

It is one of the tech centers of the United States. It's an incredibly important region.

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00:28:15,400 --> 00:28:20,400

But is there a downside to this urban expansion?

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00:28:20,400 --> 00:28:27,400

When you build a city like San Francisco on fill that's comprised of old shipwrecks,

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00:28:27,400 --> 00:28:31,400

it's not the most stable platform.

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00:28:31,400 --> 00:28:35,400

And what also adds to the challenge is when you're living near an active fault line

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00:28:35,400 --> 00:28:38,400

like the San Andreas fault line.

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00:28:38,400 --> 00:28:43,400

You start thinking about, hang on this, it's going to hold up in the next seismic event.

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00:28:43,400 --> 00:28:46,400

Yeah, I wouldn't want to be there for the next big one.

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00:28:58,400 --> 00:29:03,400

Shipwrecks underwater are amazing to dive.

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00:29:03,400 --> 00:29:08,400

They're eerie places that echo their tragic pasts.

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00:29:08,400 --> 00:29:18,400

But in San Francisco, buried shipwrecks underground may point to a tragic future.

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00:29:18,400 --> 00:29:24,400

It's not the most stable platform, especially for big modern buildings.

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00:29:24,400 --> 00:29:29,400

This is just sediment. This is just timbers which have rotted away.

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00:29:29,400 --> 00:29:34,400

This is just ships which have slowly collapsed down into the ground or been swallowed by mud.

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00:29:34,400 --> 00:29:39,400

You can live on it with no problem until there's a problem.

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00:29:46,400 --> 00:29:51,400

San Francisco is located in one of the most seismically active places in the world.

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00:29:51,400 --> 00:29:59,400

The San Andreas fault lies three miles from San Francisco, running through deep water just outside the bay.

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00:29:59,400 --> 00:30:04,400

The San Andreas fault is the boundary between the Pacific plate and the North American plate.

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00:30:04,400 --> 00:30:10,400

It runs parallel in San Francisco, which makes the city susceptible to devastating earthquakes.

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00:30:10,400 --> 00:30:17,400

The fault has shown its deadly force many times, most destructively in 1906,

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00:30:17,400 --> 00:30:21,400

when over four square miles of the city were levelled,

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00:30:21,400 --> 00:30:27,400

and the inferno that followed destroyed some 28,000 buildings.

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00:30:27,400 --> 00:30:31,400

3,000 people are believed to have died.

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00:30:31,400 --> 00:30:42,400

A century later, there remains a 72% probability of the city being hit by a high-magnitude earthquake in the next 30 years.

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00:30:43,400 --> 00:30:49,400

And such a large section of the downtown area is built on sand and ships.

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00:30:49,400 --> 00:30:56,400

As well as the obvious damage above ground, earthquakes can have a dramatic impact beneath our buildings.

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00:30:56,400 --> 00:31:06,400

Liquifaction is the process whereby vibrations from an earthquake liquefy the sediments deposited in an area,

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00:31:06,400 --> 00:31:10,400

making it act as though it is water.

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00:31:11,400 --> 00:31:15,400

Heavier structures that are sitting on top of that land that's unconsolidated

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00:31:15,400 --> 00:31:19,400

can actually sink into the sediments.

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00:31:19,400 --> 00:31:24,400

A city consumed by liquefaction is not without precedent.

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00:31:24,400 --> 00:31:26,400

There's the case of Port Royal Jamaica.

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00:31:26,400 --> 00:31:33,400

In a single morning, it went from a vibrant city into submerged into the ocean several meters.

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00:31:33,400 --> 00:31:35,400

That was liquefaction.

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00:31:36,400 --> 00:31:40,400

The area of San Francisco where the ships have been unearthed

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00:31:40,400 --> 00:31:45,400

is one of the most prone to liquefaction in the whole of California.

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00:31:45,400 --> 00:31:50,400

But do the buried ships make this natural instability worse?

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00:31:50,400 --> 00:31:54,400

So the ship structures might actually be better than just fill,

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00:31:54,400 --> 00:31:58,400

because you still have all the fill, but then also the ship structures.

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00:31:58,400 --> 00:32:02,400

I don't know that being built on top of old ships is going to make a difference,

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00:32:02,400 --> 00:32:06,400

given the fact that those high rises are buried into bedrock.

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00:32:06,400 --> 00:32:12,400

Bedrock is hard rock beneath surface soil and substraatta that can help support large structures.

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00:32:12,400 --> 00:32:17,400

But in the heart of the city, cracks have already appeared.

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00:32:17,400 --> 00:32:22,400

The Millennium Tower, which was only built in 2009, has already sunk 16 inches

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00:32:22,400 --> 00:32:26,400

and is leaning about 2 inches.

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00:32:26,400 --> 00:32:29,400

The foundations of the city's third tallest skyscraper

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00:32:29,400 --> 00:32:33,400

were installed in dense sand 80 feet down.

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00:32:33,400 --> 00:32:37,400

This is something as of serious concern for the residents there.

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00:32:37,400 --> 00:32:41,400

The skyscraper has been certified as safe.

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00:32:41,400 --> 00:32:47,400

But the next big one, a major earthquake with the destructive power to bring down buildings,

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00:32:47,400 --> 00:32:51,400

has long been feared by the citizens of San Francisco.

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00:32:51,400 --> 00:32:55,400

The question is, when will it come?

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00:32:55,400 --> 00:32:59,400

It's a huge mystery when these earthquakes will occur.

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00:32:59,400 --> 00:33:04,400

And even if we could predict them, we'd be powerless to prevent them.

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00:33:07,400 --> 00:33:11,400

So a city born of the sea is still in its grip.

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00:33:11,400 --> 00:33:16,400

But how much San Francisco's high-tech future will be brought down to earth

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00:33:16,400 --> 00:33:19,400

by the skeletons of its maritime past?

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00:33:19,400 --> 00:33:22,400

We'll have to wait and see.

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00:33:26,400 --> 00:33:27,040

The World's Greatest

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00:33:33,400 --> 00:33:39,400

Being out in the vastness of the ocean alone can be a disturbing and sometimes terrifying experience.

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00:33:39,400 --> 00:33:44,400

But what would it be like to be a solo sailor after weeks out on the water

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00:33:44,400 --> 00:33:49,400

and to suddenly be overcome by the sensation that you're not, in fact, alone?

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00:33:49,400 --> 00:33:54,400

This is exactly what happened to a man in the 1970s as he battled a massive storm.

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00:33:56,400 --> 00:33:58,400

The World's Greatest

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00:34:00,400 --> 00:34:04,400

1973, Cape Horn, Chile.

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00:34:04,400 --> 00:34:13,400

Caught in treacherous conditions in notorious seas, his world-famous 63-year-old yachtsman, Bill King.

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00:34:13,400 --> 00:34:17,400

He's attempting to circumnavigate the globe solo,

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00:34:17,400 --> 00:34:23,400

but a once-in-a-lifetime storm is threatening to take him and his boat down.

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00:34:23,400 --> 00:34:29,400

Encountering storms at sea is terrifying and it's physically exhausting.

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00:34:32,400 --> 00:34:37,400

You're up for hours on end at the wheel in heavy concentration.

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00:34:37,400 --> 00:34:43,400

What do you do? You're in a stressful situation. It's just like, how do you get through it?

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00:34:45,400 --> 00:34:48,400

After two days, he's on the brink of collapse.

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00:34:48,400 --> 00:34:53,400

When something remarkable happens, something otherworldly.

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00:34:53,400 --> 00:34:59,400

It's pretty dire and then he feels the presence of somebody there with him,

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00:34:59,400 --> 00:35:07,400

which gives him the reassurance to go below and be able to check his position and chart his course.

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00:35:08,400 --> 00:35:12,400

But this incredible tale is not an isolated incident.

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00:35:12,400 --> 00:35:20,400

Explorers across the world and throughout time claim a guardian angel has appeared and guided them to safety.

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00:35:21,400 --> 00:35:26,400

To modern researchers, this phenomenon is known as the third man.

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00:35:27,400 --> 00:35:32,400

Shackleton experienced it on his escape from Antarctica.

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00:35:32,400 --> 00:35:41,400

He reported there was another individual that gave him the courage to survive and to escape with his comrades.

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00:35:41,400 --> 00:35:51,400

Ernest Shackleton's extraordinary journey to save his entire stranded crew is considered one of the most heroic survival stories of the modern era.

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00:35:52,400 --> 00:35:59,400

So who or what is the strange apparition that appeared to him and to sailor Bill King?

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00:36:00,400 --> 00:36:08,400

Is it an imaginary friend that we create to help comfort ourselves? Is it a hallucination from not sleeping?

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00:36:09,400 --> 00:36:13,400

What are they? Who knows? Is it magic? Is it faith? What is it?

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00:36:25,400 --> 00:36:33,400

In 1973, sailor Bill King is losing a life or death solo struggle against an epic storm

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00:36:33,400 --> 00:36:38,400

when he experiences a mysterious being that science cannot explain.

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00:36:39,400 --> 00:36:44,400

This feeling of presence is known today as the third man.

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00:36:47,400 --> 00:36:56,400

Even though he's alone in the middle of the ocean and he knows he's alone, mentally he's got this idea that when he's not on deck, somebody else is watching the ship.

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00:36:57,400 --> 00:37:03,400

For a few days, he's sharing the responsibilities with this person that he feels is there.

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00:37:04,400 --> 00:37:11,400

Up to a point where he even goes to sleep and he actually tries to stay quiet when he thinks the other person is resting.

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00:37:14,400 --> 00:37:20,400

Once he got through this stressful situation, the sensation left and he was on his own again.

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00:37:21,400 --> 00:37:29,400

Is this presence a physical manifestation? Who or what is it? Is it mind generated? Is it physical?

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00:37:30,400 --> 00:37:34,400

What we do know is that it isn't just experienced on the surface.

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00:37:35,400 --> 00:37:45,400

The ocean is a dynamic environment and it pushes people to the limit. Whether you're racing around the world on a sailboat solo or whether you're diving.

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00:37:46,400 --> 00:37:56,400

In 1997, Stephanie Schwabbe, a world renowned diver, found herself minutes from running out of air when diving off the Bahamas.

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00:37:57,400 --> 00:38:05,400

She describes feeling the presence of her dead husband coming to her aid and helping her to the surface just in time.

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00:38:06,400 --> 00:38:10,400

Imagine what a relief that might be if you're off in the ocean by yourself.

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00:38:10,400 --> 00:38:20,400

These people had the presence, the third man presence, until they knew they were going to be safe and it was like after they're safe, boom, gone.

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00:38:21,400 --> 00:38:32,400

As well as appearing to adventurers in extreme situations, the third man has been experienced by people going through different types of ordeal including brain injury and bereavement.

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00:38:33,400 --> 00:38:46,400

If you are overtired, hungry, cold, haven't slept for hours and you have built up stresses and the human body reacts in different ways and not only in the body, the human mind.

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00:38:47,400 --> 00:38:57,400

In Lausanne, Switzerland, a team of neuroscientists are pioneering attempts to understand the third man with a unique experiment.

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00:38:58,400 --> 00:39:03,400

A blindfolded participant rigged to a robot makes movements with his finger.

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00:39:04,400 --> 00:39:10,400

These patterns are then replicated by a robotic arm on the person's back with a small time delay.

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00:39:10,400 --> 00:39:20,400

The scientists are observing their subjects have a disconnect between where that sensation is actually coming from.

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00:39:21,400 --> 00:39:34,400

The researchers believe that the illusion of feeling another person nearby is caused by us misperceiving the source and identity of some brain signals and this can result in an unsettling experience.

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00:39:34,400 --> 00:39:38,400

Some of them asked to stop being part of the study because it freaked them out so much.

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00:39:39,400 --> 00:39:44,400

They didn't want to continue because it's like what's this outside my body experience.

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00:39:45,400 --> 00:39:52,400

Even though test subjects know a robot is pressing on their back, the feeling of presence is still experienced.

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00:39:53,400 --> 00:39:59,400

Just like Bill King knew he was alone but still felt another being on the boat.

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00:40:00,400 --> 00:40:07,400

But why does this phenomenon feel benevolent to those in the wild yet disturbing in the laboratory?

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00:40:08,400 --> 00:40:11,400

Can scientists really recreate the situation in a lab environment?

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00:40:12,400 --> 00:40:15,400

Can they recreate the ghostly presence? Can they recreate the stress?

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00:40:16,400 --> 00:40:24,400

Because ultimately the person in the lab knows they're in the lab not in a boat alone in the middle of the ocean facing Mother Nature's fury.

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00:40:25,400 --> 00:40:36,400

Perhaps in a life or death situation stress shatters our normal understanding of reality causing a kind of guardian angel to appear when we need it most.

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00:40:40,400 --> 00:40:46,400

There are still many unanswered questions. Why can't we summon the third man at will?

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00:40:47,400 --> 00:40:53,400

And why doesn't every person in extreme danger experience the helping hand of this benign entity?

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00:40:54,400 --> 00:40:57,400

People just freak out and die and never have this third man experience.

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00:41:00,400 --> 00:41:08,400

Some people have equated this to ghosts and apparitions and mariners are superstitious by nature.

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00:41:09,400 --> 00:41:15,400

Is it evidence of something bigger? Perhaps. What that is is a mystery.

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00:41:16,400 --> 00:41:24,400

Part of me hopes that I will never experience the third man but another part is not so sure.

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00:41:25,400 --> 00:41:35,400

Those who have lived through it give us hope that deep within us there is a power to survive the most extreme situations we could ever imagine.