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00:00:00,000 --> 00:00:08,420

Can a new discovery from sunny California reveal the real event behind one of the greatest

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00:00:08,420 --> 00:00:11,000

maritime mysteries of them all?

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00:00:11,000 --> 00:00:13,240

The parting of the Red Sea.

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00:00:13,240 --> 00:00:15,000

This looks like it's the smoking gun.

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00:00:15,000 --> 00:00:18,400

It's a possible root cause of what happened.

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00:00:18,400 --> 00:00:24,760

A first world war transporter disappears without trace in calm seas.

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00:00:24,760 --> 00:00:31,480

Are rumors of a heist by German agents true or is something more mysterious at play?

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00:00:31,480 --> 00:00:35,960

It was navigating through the Bermuda Triangle when it was lost.

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00:00:35,960 --> 00:00:41,280

And could there be life on a ghost ship adrift on the high seas?

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00:00:41,280 --> 00:00:44,640

These killer monster hungry cannibal rats.

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00:00:44,640 --> 00:00:47,000

It's going to look like a house of horrors.

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00:00:47,000 --> 00:00:52,280

One would have to be pretty crazy to want to board that ship.

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00:00:52,280 --> 00:00:57,160

The underwater realm is another dimension.

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00:00:57,160 --> 00:01:06,400

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

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00:01:06,400 --> 00:01:08,120

I'm Jeremy Wade.

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00:01:08,120 --> 00:01:13,480

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

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00:01:13,480 --> 00:01:15,280

known to science.

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00:01:15,280 --> 00:01:16,920

Shipwrecks can't just disappear.

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00:01:16,920 --> 00:01:18,120

Or can they?

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00:01:18,120 --> 00:01:22,400

It's a dangerous unexplored frontier that swallows evidence.

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00:01:22,400 --> 00:01:26,320

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

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00:01:26,320 --> 00:01:31,440

Where unknown is normal and understanding is rare.

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00:01:31,440 --> 00:01:49,600

I've witnessed strange happenings on the water and some of them I can't explain.

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00:01:49,600 --> 00:01:56,840

But nothing compares with the biblical story of the parting of the Red Sea.

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00:01:56,840 --> 00:02:02,160

Is there a physical process that could explain this miraculous event?

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00:02:02,160 --> 00:02:10,040

Could an entire sea really have withdrawn leaving a corridor of dry land?

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00:02:10,040 --> 00:02:16,080

Now a breakthrough from California could unlock one of the greatest marine mysteries of all

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00:02:16,080 --> 00:02:25,120

time.

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00:02:25,120 --> 00:02:29,680

This is Egypt over 3,000 years ago.

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00:02:29,680 --> 00:02:35,360

After centuries of enslavement, the Israelites have crossed the desert and stand on the threshold

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00:02:35,360 --> 00:02:37,080

of freedom.

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00:02:37,080 --> 00:02:39,920

Their promised land lies ahead.

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00:02:39,920 --> 00:02:46,760

But behind them are Pharaoh's troops intent on returning them to slavery.

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00:02:46,760 --> 00:02:51,520

Blocking their escape is the Red Sea.

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00:02:51,840 --> 00:02:56,360

Even God commands Moses to hold out his staff over the waves.

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00:02:56,360 --> 00:03:00,400

The winds blew causing the waters to recede.

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00:03:00,400 --> 00:03:06,720

Flanked by two walls of water, the Israelites cross to the other side.

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00:03:06,720 --> 00:03:13,040

And when Pharaoh and his boys come and chase them down, the seas collapse upon them and

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00:03:13,040 --> 00:03:14,840

they're all dead.

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00:03:14,840 --> 00:03:19,520

And it's a clean break, a quick getaway.

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00:03:19,520 --> 00:03:25,040

Today many believers accept the story of the parting of the Red Sea as symbolic rather

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00:03:25,040 --> 00:03:28,160

than a description of an actual event.

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00:03:28,160 --> 00:03:32,120

But could it really have happened?

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00:03:32,120 --> 00:03:40,240

An eyewitness account from the 19th century chronicles an incident with uncanny similarities.

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00:03:40,240 --> 00:03:47,880

British Major General Sir Alexander B. Tullock is charting an area on the eastern Nile Delta.

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00:03:47,880 --> 00:03:53,200

Some scholars believe that this area, rather than what we now call the Red Sea, is where

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00:03:53,200 --> 00:03:57,040

the biblical story may have taken place.

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00:03:57,040 --> 00:04:01,000

They have to abandon their work due to strong and consistent winds.

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00:04:01,000 --> 00:04:07,680

Then they come back the next day and they find that an area that was once submerged is now

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00:04:07,680 --> 00:04:09,680

walkable.

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00:04:09,680 --> 00:04:16,320

For Tullock, this is evidence that the biblical parting could have taken place.

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00:04:16,320 --> 00:04:22,400

At the time, no rational explanation can be found for the event that Tullock witnessed.

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00:04:22,400 --> 00:04:27,680

But can modern insights fill the blanks?

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00:04:27,680 --> 00:04:33,200

A recent study uses a computer program to simulate the impact of sustained overnight

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00:04:33,200 --> 00:04:37,440

winds in the coastal area where Tullock was working.

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00:04:37,440 --> 00:04:44,000

It suggests that winds of between 63 and 70 miles per hour, lasting for 12 hours, could

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00:04:44,000 --> 00:04:49,280

part waters up to six feet deep.

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00:04:49,280 --> 00:04:55,760

Such a parting of the waves would require a specific underwater geography.

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00:04:55,760 --> 00:05:00,520

There would need to be a high spot on the bottom of the Red Sea for a land bridge to

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00:05:00,520 --> 00:05:03,000

be created when the water receded.

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00:05:03,000 --> 00:05:07,040

Moses would have to be in the right place where that shallow spot was to then be able

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00:05:07,040 --> 00:05:08,480

to cross it.

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00:05:08,480 --> 00:05:14,280

So in the right place at the right time, it appears that a land bridge through the sea

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00:05:14,280 --> 00:05:18,280

could have occurred naturally.

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00:05:18,280 --> 00:05:23,640

As intriguing as this study is, it doesn't account for the enormous walls of water described

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00:05:23,640 --> 00:05:28,800

in the biblical story.

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00:05:28,800 --> 00:05:34,400

So science must look elsewhere for answers.

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00:05:34,400 --> 00:05:40,320

A new discovery by, of all things, a tree-ring specialist in far away California may have

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00:05:40,320 --> 00:05:46,160

inadvertently unlocked this age-old sea mystery.

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00:05:46,160 --> 00:05:52,920

It's a story that begins back in 1986 when Egyptologist Hans Gurdica unveils a theory

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00:05:52,920 --> 00:05:58,680

which could account for the walls of water that accompanied the biblical sea parting.

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00:05:58,680 --> 00:06:04,720

His theory pivots on one of the most cataclysmic and controversial events in ancient history,

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00:06:04,720 --> 00:06:15,000

the eruption of Thera, a colossal volcano on the Greek island of Santorini.

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00:06:15,000 --> 00:06:21,800

This massive eruption over 3,000 years ago is one of the greatest ever recorded.

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00:06:21,800 --> 00:06:30,440

The number erupting is like 300 atomic bombs building off.

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00:06:30,440 --> 00:06:38,600

Cliffs fall into the sea as the volcanic crater collapses and the island implodes.

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00:06:38,600 --> 00:06:43,360

When you have a whole island being obliterated and that release of energy has to go somewhere,

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00:06:43,360 --> 00:06:45,600

well, it goes into the sea.

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00:06:45,600 --> 00:06:49,160

A tsunami is unleashed.

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00:06:49,160 --> 00:06:54,440

And where it ends up is central to Gurdica's theory.

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00:06:54,440 --> 00:07:01,280

The Nile Delta, one of the likely locations for the biblical sea parting.

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00:07:01,280 --> 00:07:08,760

Could this towering wall of water be the real phenomenon at the heart of the great Bible story?

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00:07:08,760 --> 00:07:14,240

As it reaches the Egyptian coast, the tsunami draws back water from the shoreline.

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00:07:14,240 --> 00:07:21,040

We have this counterintuitive situation where the waters are pulled back.

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00:07:21,040 --> 00:07:25,320

It'll come in as a series of waves that almost appear like walls.

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00:07:25,320 --> 00:07:35,200

Any witnesses would have seen the sea withdraw and walls of water form, in effect, a parting of the sea.

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00:07:35,200 --> 00:07:41,800

For Thera to be the real event behind the biblical story, it would need to have happened at the same time

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00:07:41,800 --> 00:07:50,480

as the Hebrew exodus from Egypt, often thought to be around the early to mid-16th century BC.

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00:07:50,480 --> 00:07:59,080

But the date of the Thera eruption is difficult to pin down and there has been much debate and disagreement.

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00:07:59,080 --> 00:08:05,560

Then, in 2006, researchers hit what looks like the dating jackpot.

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00:08:05,560 --> 00:08:10,840

One of the most accurate dates for the eruption of Thera is said to be from an olive tree

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00:08:10,840 --> 00:08:15,080

that's actually inside the ash layer itself.

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00:08:15,080 --> 00:08:19,520

This olive branch is a vital piece of evidence.

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00:08:19,520 --> 00:08:25,920

Because it's formed of organic material, researchers are able to test it using radiocarbon dating,

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00:08:25,920 --> 00:08:30,080

the gold standard method for dating detectives.

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00:08:30,080 --> 00:08:36,600

And that's giving a time range that can bring it down to about a 25-year window.

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00:08:36,600 --> 00:08:42,880

But the result of the analysis places the eruption in the early 17th century BC.

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00:08:42,880 --> 00:08:47,560

Approximately a century before dates mooted for the exodus.

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00:08:47,560 --> 00:08:52,960

This suggests that any attempts to connect the two events are wishful thinking.

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00:08:52,960 --> 00:08:56,400

Science is great, marvelous, because it moves us forward.

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00:08:56,400 --> 00:09:01,160

But in other ways, science can ruin a mystery.

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00:09:01,160 --> 00:09:04,120

The story should end there.

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00:09:04,160 --> 00:09:09,000

But tree ring specialist Dr. Charlotte Pearson has a different theory.

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00:09:09,000 --> 00:09:13,000

There's been a discrepancy, something that didn't add up.

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00:09:13,000 --> 00:09:17,080

Dr. Pearson believes that although it was found at the site of the eruption,

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00:09:17,080 --> 00:09:21,920

the olive branch is not an accurate indicator.

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00:09:21,920 --> 00:09:28,280

She thinks that the key to when Thera erupted lies 7,000 miles away

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00:09:28,280 --> 00:09:33,360

in the Sunshine State of California.

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00:09:33,400 --> 00:09:38,960

If the olive branch is a red herring, could Dr. Pearson's hunch resurrect the theory

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00:09:38,960 --> 00:09:43,960

that Thera is the real event behind the parting of the Red Sea?

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00:09:55,960 --> 00:09:59,960

Scientist Dr. Charlotte Pearson believes that the key to dating

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00:09:59,960 --> 00:10:04,800

one of the greatest underwater explosions of all time

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00:10:04,800 --> 00:10:08,040

lies not with an olive branch found in Greece,

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00:10:08,040 --> 00:10:12,040

but halfway around the globe in California.

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00:10:15,640 --> 00:10:18,240

Dr. Pearson's research could be the breakthrough

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00:10:18,240 --> 00:10:21,320

that finally identifies the eruption of Thera

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00:10:21,320 --> 00:10:24,440

with its subsequent tsunami as the real event

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00:10:24,440 --> 00:10:27,440

behind the Bible's sea parting story.

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00:10:28,440 --> 00:10:33,080

Trees are one of the most valuable resources for dating experts.

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00:10:33,080 --> 00:10:37,920

Since their rings form yearly, they are natural calendars.

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00:10:37,920 --> 00:10:43,520

And the bristlecone pines that grow here in California are extra special.

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00:10:43,520 --> 00:10:48,440

The oldest discovered so far is over 5,000 years old.

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00:10:48,440 --> 00:10:51,640

So one single individual tree starts life

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00:10:51,640 --> 00:10:54,520

before they build the pyramids in Egypt.

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00:10:55,520 --> 00:11:00,520

This longevity makes these pines ideal for radiocarbon dating.

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00:11:00,520 --> 00:11:04,520

In every single tree ring, there is a sample of carbon-14

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00:11:04,520 --> 00:11:06,520

in the year in which it formed.

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00:11:06,520 --> 00:11:10,520

You can get clues to what the climatic conditions were

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00:11:10,520 --> 00:11:12,520

in that period of time.

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00:11:12,520 --> 00:11:16,520

Most species of tree put on rings annually,

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00:11:16,520 --> 00:11:19,520

but olive trees are an exception.

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00:11:19,520 --> 00:11:22,520

And Dr. Pearson believes that they don't provide accurate dates

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00:11:22,520 --> 00:11:25,520

when radiocarbon tested.

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00:11:25,520 --> 00:11:28,520

She believes that bristlecone pines

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00:11:28,520 --> 00:11:31,520

are a much more reliable indicator.

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00:11:31,520 --> 00:11:37,520

And on analysis, her samples reveal something hugely significant.

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00:11:37,520 --> 00:11:41,520

They show noticeably narrower growth rings

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00:11:41,520 --> 00:11:44,520

over one specific four-year period,

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00:11:44,520 --> 00:11:48,520

indicating a short but extreme change in climate.

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00:11:48,520 --> 00:11:51,520

So we know that year of that tree's growth

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00:11:51,520 --> 00:11:56,520

was interrupted by reduced sunlight or a lot of carbon in the air.

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00:11:56,520 --> 00:12:00,520

But to be certain that this anomaly could be related to Thera,

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00:12:00,520 --> 00:12:03,520

Dr. Pearson needs to make sure it wasn't caused

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00:12:03,520 --> 00:12:06,520

by any localised weather event in California.

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00:12:06,520 --> 00:12:11,520

So she goes in search of the same evidence elsewhere in the world

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00:12:11,520 --> 00:12:16,520

and finds it 5,000 miles away in Ireland.

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00:12:17,520 --> 00:12:23,520

There are samples of Irish oaks dating back thousands of years.

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00:12:23,520 --> 00:12:26,520

And the rings in these tree samples

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00:12:26,520 --> 00:12:29,520

show exactly the same growth restrictions

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00:12:29,520 --> 00:12:33,520

occurring in the same period.

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00:12:33,520 --> 00:12:36,520

That was the big surprise moment,

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00:12:36,520 --> 00:12:39,520

because what it showed us was that here we have two trees

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00:12:39,520 --> 00:12:42,520

in very different growth locations, different latitudes,

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00:12:42,520 --> 00:12:43,520

different altitudes,

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00:12:43,520 --> 00:12:48,520

and yet essentially the measurements of C14 in the annual tree rings

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00:12:48,520 --> 00:12:51,520

are making the same pattern.

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00:12:51,520 --> 00:12:55,520

This points to a weather event of global proportions.

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00:12:55,520 --> 00:12:59,520

And an event of this scale at this period of time

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00:12:59,520 --> 00:13:04,520

could only be one thing, the eruption of Thera.

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00:13:04,520 --> 00:13:06,520

And when you have a huge eruption,

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00:13:06,520 --> 00:13:09,520

the ash in the atmosphere blocks out the sunlight

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00:13:09,520 --> 00:13:12,520

and creates like a mini-ice age sort of situation,

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00:13:12,520 --> 00:13:15,520

which causes the tree to grow really slowly.

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00:13:15,520 --> 00:13:18,520

Dr Pearson's hunch has paid off.

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00:13:18,520 --> 00:13:21,520

These new radiocarbon dating results

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00:13:21,520 --> 00:13:25,520

place the Thera eruption in the 16th century BC,

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00:13:25,520 --> 00:13:30,520

up to 100 years after the Olive Branch dates,

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00:13:30,520 --> 00:13:35,520

with massive implications for biblical scholars.

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00:13:35,520 --> 00:13:37,520

This looks like it's the smoking gun.

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00:13:37,520 --> 00:13:40,520

It's a possible root cause of what happened.

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00:13:40,520 --> 00:13:43,520

This chance breakthrough brings the Thera tsunami

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00:13:43,520 --> 00:13:47,520

back into the same period as that mooted for the Exodus.

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00:13:47,520 --> 00:13:50,520

Allowing us an entrance into a scientific explanation

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00:13:50,520 --> 00:13:53,520

for what is one of the biggest mysteries of all time.

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00:14:04,520 --> 00:14:08,520

I ventured deep under the ocean in a small submarine,

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00:14:08,520 --> 00:14:11,520

and I know how vulnerable it can make you feel.

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00:14:11,520 --> 00:14:15,520

I almost feel like an astronaut landing on the moon.

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00:14:15,520 --> 00:14:19,520

But what if you never managed to make it back up?

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00:14:19,520 --> 00:14:22,520

This is exactly what happened to the crew

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00:14:22,520 --> 00:14:25,520

of one of the very first submarines, the HL Hunley,

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00:14:25,520 --> 00:14:29,520

which vanished in action during the American Civil War.

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00:14:29,520 --> 00:14:35,520

Lost for nearly 140 years, the sub is finally found.

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00:14:35,520 --> 00:14:37,520

Now, armed with new evidence,

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00:14:37,520 --> 00:14:41,520

can science work out what happened to the Hunley?

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00:14:44,520 --> 00:14:48,520

South Carolina, the year 2000.

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00:14:48,520 --> 00:14:53,520

The HL Hunley is finally raised from the ocean floor.

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00:14:53,520 --> 00:14:55,520

It launched a successful attack.

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00:14:55,520 --> 00:14:58,520

It should have returned to base without any trouble.

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00:14:58,520 --> 00:15:01,520

So the question is, why then is it on the bottom?

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00:15:05,520 --> 00:15:08,520

1864.

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00:15:08,520 --> 00:15:10,520

At the height of the American Civil War,

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00:15:10,520 --> 00:15:15,520

Confederate submarine HL Hunley leaves base on her maiden mission.

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00:15:15,520 --> 00:15:18,520

It was built specifically to deal with the blockade

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00:15:18,520 --> 00:15:20,520

of the north against the south.

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00:15:20,520 --> 00:15:23,520

Her target is the USS Housatonic,

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00:15:23,520 --> 00:15:25,520

which is on blockade duty for Union forces

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00:15:25,520 --> 00:15:30,520

outside Charleston Harbor on the South Carolina coast.

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00:15:30,520 --> 00:15:34,520

Made of iron, the Hunley travels just beneath the surface

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00:15:34,520 --> 00:15:39,520

and features a very rudimentary propulsion system.

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00:15:39,520 --> 00:15:41,520

This was human-powered.

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00:15:41,520 --> 00:15:44,520

The crew would sit and they would hand crank

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00:15:44,520 --> 00:15:46,520

to move the ship around.

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00:15:46,520 --> 00:15:48,520

It's like working inside a coffin.

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00:15:48,520 --> 00:15:52,520

We're talking something which would make a smart car look roomy.

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00:15:52,520 --> 00:15:56,520

The HL Hunley is armed with a single torpedo.

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00:15:56,520 --> 00:16:00,520

Torpedoes were not the fire and forget weapons we think of today.

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00:16:01,520 --> 00:16:05,520

It was essentially a keg of explosives

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00:16:05,520 --> 00:16:11,520

with a prong on the end that was attached by a long wooden pole.

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00:16:11,520 --> 00:16:15,520

The submarine had to drive up beside the warship

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00:16:15,520 --> 00:16:20,520

and impregnate this cask of dynamite into the side

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00:16:20,520 --> 00:16:23,520

and then light the fuse that would explode the keg.

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00:16:24,520 --> 00:16:27,520

The submarine stealthily approaches the warship

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00:16:27,520 --> 00:16:29,520

and deploys its weapon.

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00:16:29,520 --> 00:16:34,520

135 pounds of black powder explosive

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00:16:34,520 --> 00:16:37,520

rips through the hull.

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00:16:38,520 --> 00:16:42,520

The Housatonic sinks in less than five minutes.

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00:16:44,520 --> 00:16:47,520

It's a spectacular success for the Hunley.

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00:16:47,520 --> 00:16:50,520

She's the first sub ever to sink an enemy ship.

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00:16:51,520 --> 00:16:54,520

But what happens next is a mystery.

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00:16:54,520 --> 00:16:58,520

It went out, did its job, never came home.

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00:17:00,520 --> 00:17:04,520

All trace of the Hunley is lost for almost 140 years.

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00:17:04,520 --> 00:17:07,520

But when she is finally found and raised

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00:17:07,520 --> 00:17:10,520

she is in surprisingly good condition.

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00:17:10,520 --> 00:17:13,520

The presumption was that this would be blown to bits

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00:17:13,520 --> 00:17:15,520

but in fact when they brought it up it was intact.

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00:17:16,520 --> 00:17:19,520

There was no visible damage to the hull.

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00:17:19,520 --> 00:17:20,520

Why did it sink?

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00:17:21,520 --> 00:17:25,520

Investigators set out to find an answer to the mystery.

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00:17:26,520 --> 00:17:29,520

After years on the seabed the Hunley is covered

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00:17:29,520 --> 00:17:32,520

with a thick layer of sediment called concretion.

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00:17:33,520 --> 00:17:36,520

Iron under water reacts with the salt water.

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00:17:36,520 --> 00:17:39,520

The salts in the iron create corrosion product.

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00:17:39,520 --> 00:17:44,520

Basically creates a dense impermeable layer around the iron.

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00:17:46,520 --> 00:17:49,520

This coating has helped preserve the submarine.

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00:17:50,520 --> 00:17:53,520

But unless it's removed with extreme care

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00:17:53,520 --> 00:17:57,520

the Hunley could be damaged and vital evidence lost.

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00:17:59,520 --> 00:18:03,520

And as researchers scrape away the layers of solid sediment

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00:18:03,520 --> 00:18:05,520

they make a shocking discovery.

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00:18:06,520 --> 00:18:09,520

The decomposed bodies of the Hunley's crew.

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00:18:20,520 --> 00:18:24,520

The Confederate submarine H.L. Hunley has been exhumed

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00:18:24,520 --> 00:18:28,520

from a watery grave after 136 years.

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00:18:28,520 --> 00:18:32,520

Now can clues hidden in her hull shed new light

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00:18:32,520 --> 00:18:36,520

on why this valiant little vessel never made it home.

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00:18:38,520 --> 00:18:41,520

The remains of the Hunley's crew are found.

245

00:18:41,520 --> 00:18:45,520

But it's a discovery that raises yet more questions.

246

00:18:46,520 --> 00:18:49,520

It appeared that all men died at their stations.

247

00:18:49,520 --> 00:18:51,520

Maybe these people were unbelievably heroic.

248

00:18:51,520 --> 00:18:53,520

Went down with the ship.

249

00:18:53,520 --> 00:18:56,520

Or maybe they were dead before they hit the seabed.

250

00:18:56,520 --> 00:19:00,520

If researchers can identify how these men died

251

00:19:00,520 --> 00:19:03,520

this may at last reveal what happened to the Hunley.

252

00:19:03,520 --> 00:19:07,520

The original theory about the Hunley's sinking

253

00:19:07,520 --> 00:19:10,520

was it was to do with a sonic blast of its own explosive

254

00:19:10,520 --> 00:19:13,520

that that took out the crew somehow.

255

00:19:13,520 --> 00:19:18,520

I would not want to be sitting 30 feet from a 135 pound

256

00:19:18,520 --> 00:19:22,520

black powder explosion, especially underwater.

257

00:19:25,520 --> 00:19:27,520

The pressure wave from the explosion

258

00:19:27,520 --> 00:19:29,520

is going to be traveling through the water.

259

00:19:29,520 --> 00:19:32,520

It's going to hit this air tube.

260

00:19:34,520 --> 00:19:37,520

Did the explosion of the torpedo cause some kind of

261

00:19:37,520 --> 00:19:40,520

concussive blast that knocked these guys out?

262

00:19:41,520 --> 00:19:43,520

They wouldn't be able to operate the submarine

263

00:19:43,520 --> 00:19:45,520

and eventually it would sink.

264

00:19:46,520 --> 00:19:50,520

Recent research suggests that the torpedo explosion

265

00:19:50,520 --> 00:19:53,520

while only 16 feet away from the sub

266

00:19:53,520 --> 00:19:56,520

would not have been sufficient to kill the man.

267

00:19:56,520 --> 00:19:59,520

Whether they were incapacitated by concussion

268

00:19:59,520 --> 00:20:02,520

remains an open question.

269

00:20:03,520 --> 00:20:06,520

With the blast theory proving inconclusive

270

00:20:06,520 --> 00:20:09,520

investigators go in search of new evidence.

271

00:20:09,520 --> 00:20:13,520

And while clearing away the last of the concretion

272

00:20:13,520 --> 00:20:16,520

they make a game-changing discovery.

273

00:20:17,520 --> 00:20:20,520

There appeared to be no structural damage.

274

00:20:20,520 --> 00:20:24,520

It was really only when they started to clean out the inside

275

00:20:24,520 --> 00:20:26,520

and they noticed that there was a particular pipe

276

00:20:26,520 --> 00:20:28,520

that had ruptured.

277

00:20:30,520 --> 00:20:35,520

The hole an inch across is small but potentially catastrophic.

278

00:20:35,520 --> 00:20:38,520

It's in the ballast system which pumps seawater

279

00:20:38,520 --> 00:20:42,520

in and out of the vessel to manage its buoyancy.

280

00:20:43,520 --> 00:20:47,520

Researchers calculate it would take only 50 to 70 gallons

281

00:20:47,520 --> 00:20:49,520

of water to flood the submarine.

282

00:20:49,520 --> 00:20:53,520

And just three minutes to fill it through this tiny opening.

283

00:20:53,520 --> 00:20:56,520

If you had three minutes to realize you were going to die

284

00:20:56,520 --> 00:20:58,520

would you scramble for the exits?

285

00:20:58,520 --> 00:21:00,520

Would you try to use the pump to pump it out?

286

00:21:00,520 --> 00:21:02,520

Would you try to plug the hole?

287

00:21:03,520 --> 00:21:05,520

But the crew are still at their stations

288

00:21:05,520 --> 00:21:09,520

so the leak is unlikely to be the only factor.

289

00:21:09,520 --> 00:21:11,520

Perhaps concussion did play a part

290

00:21:11,520 --> 00:21:14,520

and the men were unconscious when the sub flooded.

291

00:21:14,520 --> 00:21:17,520

Maybe it's a combination where they couldn't react

292

00:21:17,520 --> 00:21:19,520

and it was sinking at the same time.

293

00:21:19,520 --> 00:21:22,520

The thing about catastrophic accidents

294

00:21:22,520 --> 00:21:24,520

is generally there's never one thing.

295

00:21:24,520 --> 00:21:27,520

It's generally a series of things.

296

00:21:27,520 --> 00:21:31,520

The ruptured pipe may bring us closer to the truth.

297

00:21:31,520 --> 00:21:36,520

But as research continues this iconic underwater vessel

298

00:21:36,520 --> 00:21:40,520

could still have further secrets to reveal.

299

00:21:42,520 --> 00:21:46,520

The last time anyone hears from the First World War transporter

300

00:21:46,520 --> 00:21:50,520

USS Cyclops she's heading towards the Bermuda Triangle.

301

00:21:50,520 --> 00:21:53,520

But is the vanished ship just another victim

302

00:21:53,520 --> 00:21:55,520

of this notorious tract of ocean

303

00:21:55,520 --> 00:21:58,520

or are there wartime games afoot?

304

00:21:58,520 --> 00:22:02,520

Now new developments in the understanding of deep water waves

305

00:22:02,520 --> 00:22:05,520

could have been a big part of the ship's journey

306

00:22:05,520 --> 00:22:08,520

and the ship's journey to the sea.

307

00:22:08,520 --> 00:22:11,520

But in the understanding of deep water waves

308

00:22:11,520 --> 00:22:13,520

could explain what happened

309

00:22:13,520 --> 00:22:17,520

and solve a raft of other maritime disappearances.

310

00:22:19,520 --> 00:22:21,520

March 1918.

311

00:22:21,520 --> 00:22:24,520

Under the stewardship of Captain George W. Worley

312

00:22:24,520 --> 00:22:29,520

the US Navy transport ship Cyclops is preparing to set sail.

313

00:22:30,520 --> 00:22:33,520

She's loaded with 11,000 tons of manganese

314

00:22:33,520 --> 00:22:36,520

for use in wartime munitions

315

00:22:36,520 --> 00:22:39,520

and has 309 passengers and crew on board

316

00:22:39,520 --> 00:22:42,520

when she leaves Brazil bound for Baltimore.

317

00:22:44,520 --> 00:22:48,520

Nine days into the voyage the Cyclops sends a routine message

318

00:22:48,520 --> 00:22:50,520

stating that all is well.

319

00:22:53,520 --> 00:22:56,520

It's the last that is heard from her.

320

00:22:56,520 --> 00:23:00,520

The Cyclops disappears without a trace.

321

00:23:00,520 --> 00:23:03,520

That is the very last communication from the Cyclops

322

00:23:03,520 --> 00:23:07,520

and the last anyone heard from those 309 people on board.

323

00:23:09,520 --> 00:23:12,520

Nothing associated with it has ever been found.

324

00:23:12,520 --> 00:23:16,520

Not a life ring, not a note in the bottle.

325

00:23:16,520 --> 00:23:18,520

There was nothing.

326

00:23:20,520 --> 00:23:22,520

What's mysterious about the SS Cyclops

327

00:23:22,520 --> 00:23:25,520

is that she shouldn't have disappeared.

328

00:23:25,520 --> 00:23:28,520

She is this ultra-modern ship for the time.

329

00:23:28,520 --> 00:23:31,520

She's supposed to be able to make this journey quite easily.

330

00:23:31,520 --> 00:23:34,520

Of course when she disappears she is in the Bermuda Triangle

331

00:23:34,520 --> 00:23:36,520

and that's always interesting.

332

00:23:39,520 --> 00:23:43,520

But for once this notorious area of ocean in the North Caribbean

333

00:23:43,520 --> 00:23:46,520

is not the prime suspect.

334

00:23:46,520 --> 00:23:50,520

The finger of suspicion instead falls on the ship's captain.

335

00:23:50,520 --> 00:23:54,520

It turns out that George W. Worley was in fact christened

336

00:23:54,520 --> 00:23:58,520

Johann Frederick Wichmann and born in Germany.

337

00:23:58,520 --> 00:24:03,520

With the world at war his allegiances become the subject of intense speculation.

338

00:24:03,520 --> 00:24:06,520

Some said he was a German sympathiser.

339

00:24:06,520 --> 00:24:11,520

So the theory is that it was some sort of wartime heist

340

00:24:11,520 --> 00:24:15,520

that the captain and potential German agents

341

00:24:15,520 --> 00:24:18,520

tried to abscond with the Cyclops.

342

00:24:19,520 --> 00:24:24,520

If true this ranks among the most audacious wartime missions ever.

343

00:24:24,520 --> 00:24:28,520

If not an innocent man has been wrongly accused.

344

00:24:29,520 --> 00:24:32,520

So what really happened?

345

00:24:34,520 --> 00:24:38,520

Fast forward over 75 years to the seas of Norway

346

00:24:38,520 --> 00:24:41,520

where a seemingly unrelated incident is about to unleash

347

00:24:41,520 --> 00:24:46,520

a chain of scientific discoveries which could hold the answer.

348

00:24:48,520 --> 00:24:52,520

Among a barrage of 25 foot storm waves

349

00:24:52,520 --> 00:24:59,520

an oil rig fitted with lasers records one that measures a massive 85 feet high.

350

00:25:00,520 --> 00:25:06,520

For years scientists have speculated about the existence of these gigantic rogue waves.

351

00:25:06,520 --> 00:25:09,520

Now finally there is proof.

352

00:25:09,520 --> 00:25:13,520

Rogue waves are built up by environmental conditions

353

00:25:13,520 --> 00:25:16,520

which involve very fierce winds.

354

00:25:17,520 --> 00:25:20,520

Storms create ocean swells which in some cases

355

00:25:20,520 --> 00:25:24,520

can combine to form these mid-ocean monsters.

356

00:25:26,520 --> 00:25:31,520

Similar to sound waves ocean waves can travel at different speeds

357

00:25:31,520 --> 00:25:36,520

and pile up in a process known as constructive interference.

358

00:25:38,520 --> 00:25:41,520

Sitting between the Atlantic and the Caribbean

359

00:25:41,520 --> 00:25:44,520

where storm systems can converge

360

00:25:44,520 --> 00:25:49,520

the Bermuda Triangle is particularly prone to these 100 foot waves.

361

00:25:50,520 --> 00:25:53,520

But there are no other than the Bermuda Triangle

362

00:25:53,520 --> 00:25:57,520

which can be used to create these 100 foot giants.

363

00:26:00,520 --> 00:26:03,520

However at the time of the Cyclops's disappearance

364

00:26:03,520 --> 00:26:06,520

there were no reports of storms.

365

00:26:07,520 --> 00:26:10,520

A fact confirmed by her final message.

366

00:26:11,520 --> 00:26:13,520

Weather's fair as well.

367

00:26:14,520 --> 00:26:17,520

But new understanding of underwater wave behaviour

368

00:26:17,520 --> 00:26:20,520

can only be formed in calm seas.

369

00:26:32,520 --> 00:26:35,520

The unexplained disappearance of the First World War

370

00:26:35,520 --> 00:26:38,520

transport ship USS Cyclops

371

00:26:38,520 --> 00:26:43,520

gives rise to rumours of a brazen heist by her German born captain.

372

00:26:43,520 --> 00:26:47,520

But could new developments in the understanding of rogue waves

373

00:26:47,520 --> 00:26:53,520

exonerate him and solve other maritime mysteries in the Bermuda Triangle?

374

00:26:54,520 --> 00:26:56,520

Rogue waves are these unusually large waves

375

00:26:56,520 --> 00:26:59,520

that can occur amongst a sequence of storm waves

376

00:26:59,520 --> 00:27:02,520

or even in calmer conditions.

377

00:27:03,520 --> 00:27:06,520

Recent research has shown that these maritime monsters

378

00:27:06,520 --> 00:27:09,520

can form when normal waves encounter strong currents

379

00:27:09,520 --> 00:27:12,520

moving in the opposite direction.

380

00:27:14,520 --> 00:27:18,520

With the warm Atlantic Gulf Stream flowing right through it

381

00:27:18,520 --> 00:27:22,520

the Bermuda Triangle is particularly prone.

382

00:27:24,520 --> 00:27:27,520

But could a freak wave outgun the navy

383

00:27:27,520 --> 00:27:30,520

and take out a transporter of this size?

384

00:27:32,520 --> 00:27:37,520

In 2018 British oceanographers set out to answer this very question.

385

00:27:38,520 --> 00:27:41,520

The team builds a scale model of the Cyclops

386

00:27:41,520 --> 00:27:45,520

and recreates surges using indoor wave simulators.

387

00:27:47,520 --> 00:27:51,520

Their experiments yield a counter-intuitive result.

388

00:27:52,520 --> 00:27:56,520

The bigger the ship, the greater the chance of capsize.

389

00:27:57,520 --> 00:28:00,520

To maximise chances of survival

390

00:28:00,520 --> 00:28:03,520

the captain would have to literally ride the waves

391

00:28:03,520 --> 00:28:06,520

steering directly towards them.

392

00:28:06,520 --> 00:28:11,520

Where a ship of that type is most vulnerable is on its sides.

393

00:28:12,520 --> 00:28:15,520

And with no notice of the approaching killer wave

394

00:28:15,520 --> 00:28:19,520

it could have been too late to reposition a ship of this size.

395

00:28:20,520 --> 00:28:23,520

It had a huge superstructure and it's very likely

396

00:28:23,520 --> 00:28:26,520

that it was essentially knocked over.

397

00:28:27,520 --> 00:28:29,520

Does this new understanding of rogue waves

398

00:28:29,520 --> 00:28:32,520

and their potential effects on large vessels

399

00:28:32,520 --> 00:28:34,520

solve the mystery of the Cyclops?

400

00:28:34,520 --> 00:28:36,520

Even though you have the latest technology

401

00:28:36,520 --> 00:28:38,520

to see how a ship is behaving within a tank

402

00:28:38,520 --> 00:28:41,520

you can't be 100% sure what happened to the ship.

403

00:28:41,520 --> 00:28:45,520

Or did German agents pull off one of the most brazen heists

404

00:28:45,520 --> 00:28:47,520

in maritime history?

405

00:28:47,520 --> 00:28:50,520

I personally think it's not in the Bermuda Triangle.

406

00:28:50,520 --> 00:28:53,520

I think that they may actually have been trying to take it to Germany.

407

00:28:53,520 --> 00:28:58,520

Until the wreck is found, the mystery lives on.

408

00:29:05,520 --> 00:29:08,520

Since I first set sail as a teenager

409

00:29:08,520 --> 00:29:11,520

technology has dramatically improved our ability

410

00:29:11,520 --> 00:29:14,520

to track vessels at sea.

411

00:29:14,520 --> 00:29:18,520

Satellites have revolutionised the science of surveillance.

412

00:29:18,520 --> 00:29:23,520

But on occasion even large boats can drop off the grid.

413

00:29:23,520 --> 00:29:26,520

These ghost ships are potential hazards

414

00:29:26,520 --> 00:29:30,520

to anything else on the water have to be found.

415

00:29:35,520 --> 00:29:38,520

Russian cruise ship, the Lubov Olova

416

00:29:38,520 --> 00:29:41,520

has been carrying passengers on Arctic cruises

417

00:29:41,520 --> 00:29:43,520

for more than 20 years.

418

00:29:43,520 --> 00:29:47,520

But in 2010 her travels grind to a halt.

419

00:29:48,520 --> 00:29:51,520

She's impounded in Newfoundland, Canada

420

00:29:51,520 --> 00:29:54,520

and eventually sold for scrap.

421

00:29:55,520 --> 00:29:59,520

But her final journey is anything but plain sailing.

422

00:29:59,520 --> 00:30:02,520

It's being taken to the Dominican Republic to be scrapped

423

00:30:02,520 --> 00:30:06,520

and the tug isn't up to the job.

424

00:30:06,520 --> 00:30:09,520

Very soon after leaving Harbour,

425

00:30:09,520 --> 00:30:12,520

the Lubov snaps its toe and comes loose

426

00:30:12,520 --> 00:30:17,520

and floats off on its own with no power,

427

00:30:17,520 --> 00:30:21,520

no crew and essentially becomes a ghost ship.

428

00:30:22,520 --> 00:30:27,520

The Olova is adrift in some of the world's busiest shipping lanes.

429

00:30:27,520 --> 00:30:30,520

She joins a global phantom fleet

430

00:30:30,520 --> 00:30:33,520

They are floating metallic icebergs

431

00:30:33,520 --> 00:30:37,520

which can cause tremendous trouble by wandering into sea lanes.

432

00:30:38,520 --> 00:30:40,520

The race is on to find her.

433

00:30:42,520 --> 00:30:45,520

Seven days later, on the other side of the Atlantic,

434

00:30:45,520 --> 00:30:48,520

the Irish Coast Guard is put on alert.

435

00:30:48,520 --> 00:30:51,520

The Olova may be heading their way.

436

00:30:54,520 --> 00:30:57,520

The Coast Guard is part of a new international project

437

00:30:57,520 --> 00:30:59,520

called Sea Sigma,

438

00:30:59,520 --> 00:31:03,520

their mission to harness the power of emerging technology

439

00:31:03,520 --> 00:31:06,520

in the fight against maritime crime.

440

00:31:06,520 --> 00:31:11,520

First, satellites identify anything that looks like a ship.

441

00:31:11,520 --> 00:31:13,520

This is cross-referenced with data

442

00:31:13,520 --> 00:31:17,520

from the Worldwide Automatic Identification System, or AIS,

443

00:31:17,520 --> 00:31:21,520

which tracks the position of all active vessels.

444

00:31:23,520 --> 00:31:26,520

As the Olova is no longer in the hands of the Olova,

445

00:31:26,520 --> 00:31:29,520

the Olova is no longer emitting an AIS signal

446

00:31:29,520 --> 00:31:32,520

when a so-called dark vessel is identified

447

00:31:32,520 --> 00:31:36,520

matching her footprint, it looks like they've found her.

448

00:31:37,520 --> 00:31:40,520

But when the Coast Guard gets to the search area,

449

00:31:40,520 --> 00:31:44,520

the Olova is nowhere to be seen.

450

00:31:45,520 --> 00:31:47,520

Even with the best technology,

451

00:31:47,520 --> 00:31:50,520

accurately predicting the position of a drifting craft

452

00:31:50,520 --> 00:31:53,520

in open ocean can be next to impossible.

453

00:31:54,520 --> 00:31:57,520

But the Irish Coast Guard aren't the only people

454

00:31:57,520 --> 00:31:59,520

looking for the Olova.

455

00:31:59,520 --> 00:32:03,520

It might be a ghost ship, but this is a goldmine for salvagers.

456

00:32:03,520 --> 00:32:07,520

Under maritime law, it's finder's keepers.

457

00:32:07,520 --> 00:32:12,520

Anyone salvaging an abandoned vessel is entitled to a reward

458

00:32:12,520 --> 00:32:16,520

based on the value of the ship and its contents.

459

00:32:16,520 --> 00:32:21,520

But salvagers in pursuit of the Olova can't find her either.

460

00:32:21,520 --> 00:32:26,520

It's becoming an international game of cat and mouse.

461

00:32:26,520 --> 00:32:31,520

And before long, another type of rodent hits the headlines.

462

00:32:31,520 --> 00:32:33,520

One of the stories going around about this ship

463

00:32:33,520 --> 00:32:36,520

is that should anyone find it and go on it,

464

00:32:36,520 --> 00:32:38,520

it's going to be full of rats.

465

00:32:40,520 --> 00:32:44,520

Speculation mounts as to how an army of rats

466

00:32:44,520 --> 00:32:47,520

might sustain themselves adrift at sea.

467

00:32:47,520 --> 00:32:50,520

They'll chew insulation on wires,

468

00:32:50,520 --> 00:32:53,520

but sooner or later, there will be no food supply.

469

00:32:53,520 --> 00:32:58,520

And then once that runs out, perhaps they're eating one another.

470

00:32:58,520 --> 00:33:01,520

The rat rumors run wild.

471

00:33:01,520 --> 00:33:05,520

These killer monster hungry cannibal rats.

472

00:33:05,520 --> 00:33:07,520

It's going to look like a house of horrors.

473

00:33:07,520 --> 00:33:10,520

One would have to be pretty crazy to want to board that ship.

474

00:33:10,520 --> 00:33:14,520

But is there any truth to these rat tales?

475

00:33:14,520 --> 00:33:17,520

It's possible that this is a story that's going around

476

00:33:17,520 --> 00:33:20,520

to try to prevent people from trying to find the ship.

477

00:33:20,520 --> 00:33:25,520

A fog of mystery surrounds the ghost ship Olova.

478

00:33:25,520 --> 00:33:29,520

But suddenly, the game's back on.

479

00:33:29,520 --> 00:33:32,520

Coast guards are alerted to a distress signal

480

00:33:32,520 --> 00:33:36,520

700 nautical miles off the west coast of Ireland.

481

00:33:36,520 --> 00:33:40,520

The signal is traced to an electronic device called an EPIRB,

482

00:33:40,520 --> 00:33:44,520

assigned to one of the Olova's six lifeboats.

483

00:33:44,520 --> 00:33:48,520

But EPIRBs only activate once lifeboats have been launched.

484

00:33:48,520 --> 00:33:53,520

Is there life on the ghost ship after all?

485

00:34:04,520 --> 00:34:07,520

The ghost ship Olova is at large on the high seas,

486

00:34:07,520 --> 00:34:11,520

but now the coast guard has been alerted by a distress signal.

487

00:34:11,520 --> 00:34:15,520

Could someone or something still be on board?

488

00:34:18,520 --> 00:34:21,520

The coast guard can't take any chances,

489

00:34:21,520 --> 00:34:26,520

so they scramble a plane for an aerial search.

490

00:34:26,520 --> 00:34:31,520

But once again, there's no sign of the missing ship.

491

00:34:31,520 --> 00:34:34,520

Getting the signal from the lifeboats themselves

492

00:34:34,520 --> 00:34:36,520

could be a couple of things.

493

00:34:36,520 --> 00:34:39,520

Either somehow they fell off the ship itself

494

00:34:39,520 --> 00:34:41,520

and the ship is still floating,

495

00:34:41,520 --> 00:34:43,520

or it could have actually been the ship sinking

496

00:34:43,520 --> 00:34:47,520

and that these lifeboats at that point ended up in the water.

497

00:34:47,520 --> 00:34:50,520

Experts have speculated that it has in fact sank.

498

00:34:50,520 --> 00:34:54,520

The others have speculated that it's somewhere up off Greenland.

499

00:34:54,520 --> 00:34:57,520

So ultimately, we may never know.

500

00:34:57,520 --> 00:35:02,520

For now, only the Olova and her rumored cargo of ravenous rats

501

00:35:02,520 --> 00:35:04,520

know the truth,

502

00:35:04,520 --> 00:35:08,520

and this ghost ship continues to haunt the high seas.

503

00:35:17,520 --> 00:35:19,520

For medieval sailors,

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00:35:19,520 --> 00:35:24,520

the Portland charts revolutionise navigation on the high seas.

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00:35:24,520 --> 00:35:27,520

In an age when the world is still considered to be flat,

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00:35:27,520 --> 00:35:31,520

these astonishingly detailed maritime maps

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are light years ahead of their time.

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But how they were made and used

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00:35:36,520 --> 00:35:39,520

has defied explanation for centuries.

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Can a new discovery finally crack this ancient maritime code?

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Before the early medieval period,

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using a chart to sail to a place you had never been

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00:35:58,520 --> 00:36:00,520

was a dangerous endeavour.

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00:36:00,520 --> 00:36:04,520

Early charts were very imprecise from a navigational standpoint.

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00:36:04,520 --> 00:36:07,520

You really only were able to navigate headland to headland

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00:36:07,520 --> 00:36:12,520

and you would touch the coast along the way to get anywhere you had to go.

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Then, as if from nowhere, a new kind of chart appears,

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with new levels of accuracy that reduce reliance on visual landmarks

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00:36:23,520 --> 00:36:26,520

and help to open up new routes.

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It was as if the mapmaker could look down upon the area from space.

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00:36:34,520 --> 00:36:38,520

In a world with untold wealth waiting to be discovered,

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00:36:38,520 --> 00:36:40,520

navigation is power.

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00:36:40,520 --> 00:36:43,520

These were highly secretive.

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00:36:43,520 --> 00:36:45,520

They were talked about in hushed tones,

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00:36:45,520 --> 00:36:47,520

captains traded for them.

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People probably gave up their lives to deliver them and to protect them.

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On the surface, the Portland charts look like a tangled mess of geometric lines

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spreading out from seemingly random points in all directions.

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00:37:02,520 --> 00:37:06,520

These rum lines are 16 lines emanating from a central point

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00:37:06,520 --> 00:37:10,520

and these lines are all over the portal lines.

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00:37:10,520 --> 00:37:12,520

But how these lines were created

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00:37:12,520 --> 00:37:17,520

and how the charts were used seven centuries ago is shrouded in secrecy.

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00:37:17,520 --> 00:37:21,520

A closely guarded medieval puzzle waiting to be solved.

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00:37:22,520 --> 00:37:26,520

Now, a blue sky breakthrough in, of all things,

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00:37:26,520 --> 00:37:30,520

the geometry of spot patterns on butterfly wings

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00:37:30,520 --> 00:37:35,520

could provide the key to unlock the mystery of these ancient charts.

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The Portland charts marked a giant leap forward in medieval navigation,

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but how they were created remains a mystery.

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00:37:56,520 --> 00:38:01,520

We don't have written records in terms of how to use one,

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00:38:01,520 --> 00:38:05,520

what the lines represent in relation to one another.

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00:38:05,520 --> 00:38:09,520

I think we've lost a lot of the information.

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00:38:10,520 --> 00:38:13,520

But in 2018, there's a breakthrough.

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00:38:14,520 --> 00:38:18,520

Renowned mathematician and butterfly enthusiast, John Hessler,

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makes a radical connection between the Portland charts

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and a seemingly unrelated natural phenomenon.

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Hessler has tracked the differences in the spots on butterfly wings

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across the Alps in a method called morphometrics.

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Hessler, a chemical engineer by trade, is also a passionate amateur lepidopterist

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and he's studying the evolutionary relationships

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among the many butterfly species found in the French Alps.

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Using mapping software, he tracks butterflies from different areas

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and deploys a technique called morphometrics,

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a scientific method of analysing form

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00:39:00,520 --> 00:39:06,520

to assess the relationships between the placement of the spots on the butterfly's wings.

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Now, Hessler wonders whether a similar method

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00:39:10,520 --> 00:39:14,520

might help decode the secrets of the Portland charts.

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But instead of different points on butterfly wings,

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00:39:18,520 --> 00:39:22,520

this time he's looking at different points on geographical maps,

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such as headlands and ports.

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So using that, he's trying to reverse engineer how the mathematicians

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and the navigators and the surveyors were able to kind of create these maps.

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Hessler is looking for patterns in the differences

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00:39:39,520 --> 00:39:42,520

between the Portland charts and other maps.

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He took about 100 points from the Portland maps

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and made comparisons to our modern maps.

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He uses algorithms within computerized mapping software

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00:39:55,520 --> 00:39:57,520

to make these comparisons,

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00:39:57,520 --> 00:40:03,520

so we have a very good mathematical way of distinguishing accuracy from inaccuracy.

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00:40:04,520 --> 00:40:07,520

Patterns could reveal the Portland's geometric structure

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00:40:07,520 --> 00:40:10,520

and finally tell us how they were made.

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00:40:12,520 --> 00:40:16,520

And what he finds is fascinating.

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00:40:17,520 --> 00:40:20,520

After analyzing 22 ancient charts,

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00:40:20,520 --> 00:40:24,520

all of which appear vastly different to the naked eye,

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00:40:24,520 --> 00:40:29,520

he works out that they bear one remarkable similarity.

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00:40:29,520 --> 00:40:34,520

They are all offset by almost exactly the same amount.

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8.5 degrees from true north.

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The really significant thing is the difference of 8.5 degrees.

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It's the difference between true north and magnetic north,

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00:40:46,520 --> 00:40:50,520

so they were all orientated onto magnetic north.

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And this makes sense,

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because at the time the charts were compiled,

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compasses of the new medieval must have.

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00:40:58,520 --> 00:41:03,520

It's only when the magnetic compasses start to come into wider use

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00:41:03,520 --> 00:41:07,520

you have the information coming through that you can use to make these maps.

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00:41:07,520 --> 00:41:10,520

Hessler has cracked the code,

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00:41:10,520 --> 00:41:13,520

figuring out not only how the charts came to be,

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00:41:13,520 --> 00:41:16,520

but also why they're so accurate.

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00:41:16,520 --> 00:41:21,520

The Portland mapmakers were more advanced than we thought they were

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00:41:21,520 --> 00:41:23,520

in terms of putting that map together.

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00:41:23,520 --> 00:41:30,520

The best mapmakers actually are able to compile data from all kinds of places.

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The mapmakers are using the logbooks and the records of many, many different sailors,

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00:41:36,520 --> 00:41:41,520

and what they're putting down as their compass positions to try and draw these maps.

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00:41:41,520 --> 00:41:45,520

These maps were the product of large data analysis themselves.

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00:41:45,520 --> 00:41:50,520

It turns out that these medieval mapmakers were harvesting big data

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00:41:50,520 --> 00:41:53,520

800 years before Silicon Valley.

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00:41:54,520 --> 00:41:57,520

There's no secret like a trade secret,

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00:41:57,520 --> 00:42:01,520

so the mystery of exactly who these mapmakers were remains.

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00:42:01,520 --> 00:42:06,520

But for now, our butterfly enthusiast helps us chart a course

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00:42:06,520 --> 00:42:10,520

that takes us a little closer to the truth.