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Issue: VI October 2026 Edition

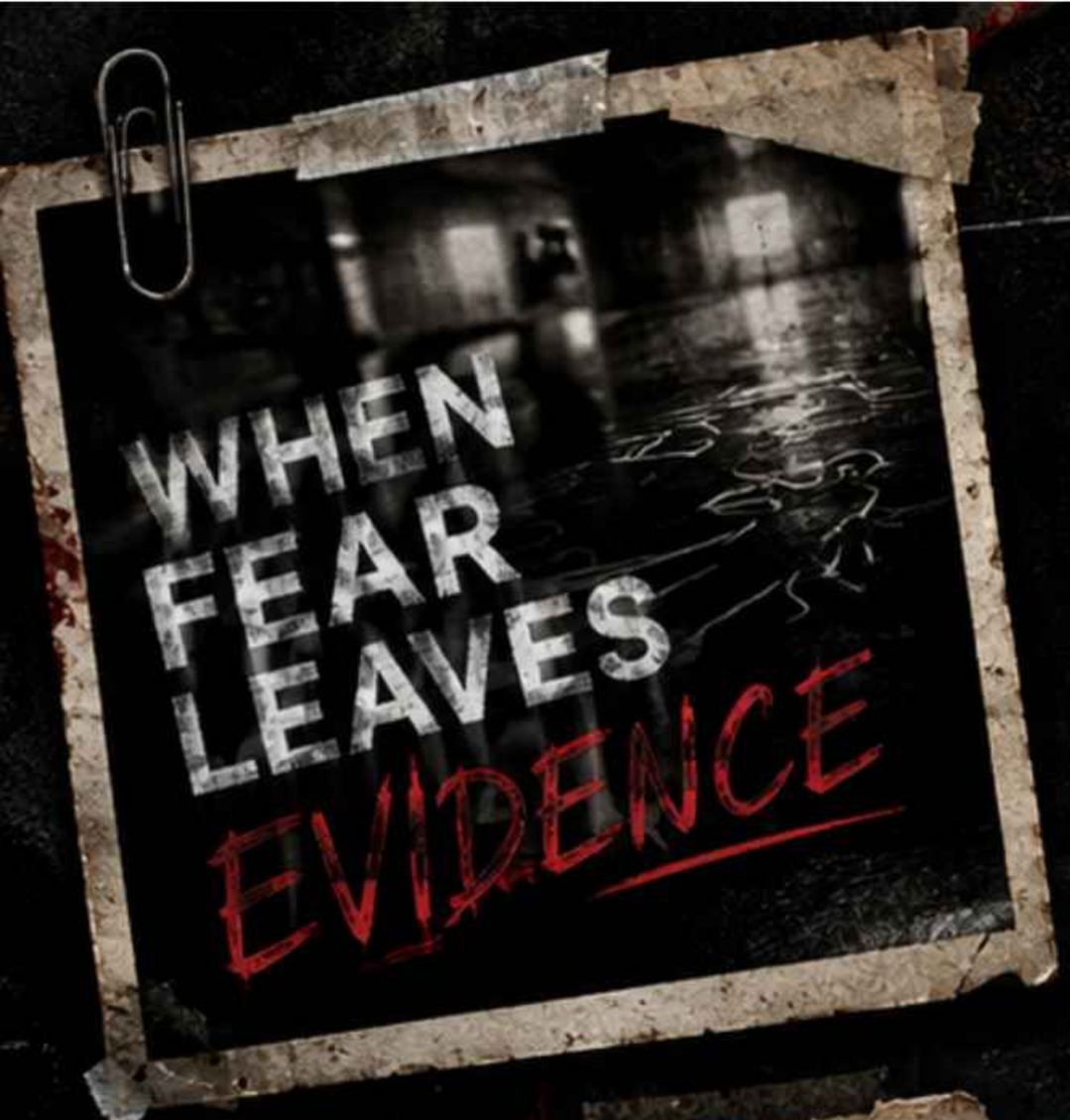
ANVIKSHA

UNCOVERING THE TRUTH BEHIND EVERY PIECE OF EVIDENCE

WHEN FEAR LEAVES EVIDENCE

- **THE SALEM WITCH TRIALS**
  ERGOT FUNGUS AND THE TOXICOLOGICAL ANALYSIS OF "BEWITCHMENT"
- **VAMPIRE FOLKLORE AND DECOMPOSITION**
  A FORENSIC PATHOLOGY EXPLANATION OF THE "UNDEAD"
- **HAUNTED HOUSES AND CARBON MONOXIDE**
  ERGOT TOXICOLOGY, MISDIAGNOSIS AND HALLUCINATION
- **SPONTANEOUS HUMAN COMBUSTION AND THE WICK EFFECT**
  A FORENSIC FIRE-INVESTIGATION REVIEW

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Introduction to When Fear Leaves Evidence

Fear doesn't always leave a voice.
Sometimes, it leaves behind a trace –
in a fingerprint, a footprint, a forgotten
message, or a change in behaviour.

This issue explores how fear manifests
in real-world investigations, the psychology
behind it, and the evidence it leaves behind.
From victims to perpetrators, fear shapes
choices, actions and, ultimately,
the clues we find.

CRIME BIAS
TOP SECRET
INVESTIGATIONS

Our objectives

1. **Psychological Impact of Fear**
   Explore how fear affects human behaviour, decision-making and memory – and how it leaves subtle traces in investigations.

2. **Physical Evidence**
   Study the types of evidence linked to fear, from biological markers to environmental clues, and how they are collected and analysed.

3. **Case Studies**
   Analyse real-life cases where fear played a key role, and how investigators used evidence to uncover the truth.

4. **Prevention & Awareness**
   Understand how recognising fear-related patterns can help in both solving crimes and preventing future ones.

Our activities

1. **Case Study Analysis**
   Read and examine real cases where fear left evidence, and identify the key clues, methods and outcomes.

2. **Forensic Workshop**
   Learn about different types of forensic evidence linked to fear – hands-on analysis, sample inspection and interpretation.

3. **Expert Talk / Guest Lecture**
   Get insights from forensic experts, psychologists or law enforcement professionals on how fear influences investigations.

4. **Interactive Activities**
   Solve mini cases, crack clues, and work in teams to piece together the evidence left behind by fear.

5. **Digital Awareness Campaign**
   Create posters, reels or infographics to spread awareness about how fear can leave a trace, including tips on personal safety and recognising warning signs.

6. **Reflection & Discussion**
   Discuss the ethical, emotional and societal impact of fear in crime and justice.





MS. SHUBHAM CHAKRABORTY

(FOUNDER & CHAIRMAN - CRIME BIAS | AUTHOR |
DFCC FAFE | RISK MANAGEMENT (CYBER FORENSICS)

FOUNDER'S MESSAGE

Welcome to Crime Bias Magazine, a platform established to promote knowledge, research, and awareness in forensic science, criminology, cybercrime, and criminal investigation. Our mission is to bridge the gap between scientific research and practical application by providing accurate, evidence-based, and informative content. We believe that education, innovation, and ethical practices are essential for strengthening the criminal justice system. I extend my sincere gratitude to our editorial team, contributors, and readers for their continued support in making this initiative a valuable source of learning and professional excellence.



MS.NAKSHIKA GAUTAMBHAI TRIVEDI

(DIRECTOR - MAGAZINE DEPARTMENT)

DIRECTOR'S MESSAGE

It is my pleasure to present Anviksha Magazine, a publication dedicated to sharing reliable knowledge and the latest developments in forensic science and crime investigation. Our Magazine Department is committed to maintaining high editorial standards by publishing well-researched, accurate, and engaging content for students, researchers, professionals, and enthusiasts. We welcome valuable contributions from experts and aspiring authors and look forward to building a strong platform for learning, research, and the exchange of ideas.



MR. SHIV GAUTAMBHAI TRIVEDI

(EDITOR-IN-CHIEF'S MESSAGE)

EDITOR-IN-CHIEF'S MESSAGE

It is a privilege to serve as the Editor-in-Chief of Anviksha Magazine. Our mission is to provide a credible platform for sharing quality research, innovative ideas, and evidence-based knowledge in forensic science, criminology, cyber security, law, and criminal investigation. We are committed to maintaining high editorial standards while publishing informative and impactful content for students, researchers, professionals, and enthusiasts. We welcome valuable contributions from experts and aspiring authors and look forward to building a strong platform for learning, research, and the exchange of ideas.

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Uncovering the Truth Behind Every Piece of Evidence.

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ACOUSTIC FORENSICS & BEHAVIORAL EVIDENCE

BELL WITCH HAUNTING

Introduction

Acoustic forensics is the study of sound, recordings, vibrations and other acoustic clues that can help in an investigation. Behavioral evidence looks at actions, spoken accounts and how people perceive events to figure out what might have occurred.

Cases involving supposed hauntings and strange occurrences are examples of why investigators must separate observations, witness stories and actual scientific proof. The Bell Witch case mainly shows why toxicology and document analysis are important. The Enfield Poltergeist case highlights the need for analysis, photo evaluation and careful examination of statements. Vic Tandy's research shows how infrasound—sound, below the range of hearing—might explain eerie experiences through environmental factors.

Background

The Bell Witch is a known story about a haunting that is linked to the Bell family in Robertson County, Tennessee United States of America. The creepy events were said to have happened between 1817 and 1821. Later stories say that the Bell family heard noises, voices and felt odd disturbances. John Bell, who led the family got very ill. Died on December 20 1820. Many later writers blamed the death on the Bell Witch. But there is a point from a forensic view: no records from the time prove that supernatural events took place. The first mention of the legend was, in an 1886 history book and the first full story appeared in 1894 from Martin Van Buren Ingram. The diary that was claimed to be the source has never been found.

Suspected Poisoning of John Bell

According to a story John Bell got very sick and a strange substance was said to be found in the Bell home. The tale said the substance was dangerous and that it caused Bells death. From a science point of view though this cannot be seen as a proven case of poisoning because there is no leftover evidence that can be tested now.

A modern investigation would require:

The suspected substance
Original container
Biological samples
Medical records
Autopsy findings
Toxicological analysis

In a suspected poisoning, investigators may examine:
Blood
Urine
Hair
Tissue
Stomach contents
Food and drink

Suspected chemicals or residues
A typical investigation would be:
Suspected substance → Evidence collection → Laboratory examination → Identification of substance → Toxicological interpretation → Cause-of-death assessment
If the Bell Witch case were investigated today, laboratory testing would be essential before concluding that poisoning caused John Bell's death.

Document Analysis

Document analysis is another area in forensics for this case because a lot of the Bell Witch story comes from old written records.
A forensic document examiner might look at:
Handwriting
Signatures
Ink
Paper
Changes
Erasures
Additions
Dates

Whether the documents are the main issue, with the Bell Witch story is that there are not many original documents and it is not clear if they are trustworthy. Since the original diary that was said to exist has never been found later stories cannot simply be considered as evidence.

Forensic Importance

The Bell Witch case shows that:

1. Historical claims should be kept apart, from verified facts.
2. A suspected poisoning needs toxicological evidence to be proven.
3. Documents must be. Authenticated before they are treated as reliable evidence.
4. Oral stories and later accounts might have mistakes or extra details added over time.
5.Investigators should always think about possible explanations.

Conclusion

The Bell Witch case is key, for study because it shows the limits when one tries to investigate a historical death without any preserved physical evidence. The claimed poisoning of John Bell cannot be confirmed using toxicology. The Bell Witch case therefore highlights the importance of evidence, reliable documentation and scientific verification.

ENFIELD POLTERGEIST

Introduction

The Enfield Poltergeist is one of Britains famous reported ghost stories. It started in 1977 in Enfield, North London in a house where the Hodgson family lived.
Reported events included
Strange knocking sounds
Objects appearing to move
Doors opening or shutting
Furniture being disturbed
Unusual voices
Objects moving on their
Photographs and audio recordings

The case was investigated by Maurice Grosse and Guy Lyon Playfair, associated with the Society for Psychical Research (SPR). Their investigation continued for about two years.

Investigation and Evidence
The investigators spent a lot of time watching the family. Guy Lyon Playfair was said to have stayed with the family for 180 days and nights including 25 times when he stayed up all night. Than 140 hours of tapes were collected and the written versions of those tapes filled hundreds of pages.
The SPR archives still have the recordings that Grosse and Playfair made during their work.
This makes Enfield very important, for forensics.

Forensic Audio Examination
I have studied audio analysis for many years. Forensic audio analysis examines recorded sound in a way.
I usually outline the tasks that Forensic audio analysis covers. It can involve:

- **Speaker comparison**
- **Background noise examination**
- **Frequency analysis**
- **Detection of edits**
- **Examination of recording quality**
- **Identification of possible sound sources**
- **Assessment of whether the recording has been manipulated**

I think the following questions are crucial, in the Enfield case.
1.Is the recording original?
The original recording should be preserved of relying only on copied or edited versions.
2. Has the recording been edited? An examiner can look for: Abrupt changes breaks Different background noise
Changes in recording characteristics
3. What is the source of the voice?
The unusual voice reportedly associated with Janet Hodgson became one of the most discussed features of the case.
A forensic examiner would compare:

- **Pitch**
- **Frequency**
- **Speech patterns**
- **Vocal characteristics**
- **Breathing**
- **Background sounds**

4. Could the sound have a normal explanation?
Investigators should consider:

- **Human speech**
- **Deliberate vocal effects**
- **Mechanical sounds**
- **Household noises**
- **Acoustics of the room**
- **Recording artifacts**
- **The existence of a strange recording does not by itself establish a supernatural explanation**

Hoax Analysis

The Enfield case has remained controversial because some incidents were alleged to have been faked by members of the family.
However, forensic analysis should avoid assuming that:
“Some incidents were fake = everything was fake.”
Each event must be examined separately.
Interestingly, even within the SPR, opinions differed. Some investigators believed that some events may have been genuine, while others suspected that some disturbances were deliberately produced.

Conclusion

The Enfield Poltergeist is still a case that people argue about. Its importance for science is not about proving that a ghost was there but about showing how strange sounds, pictures and things people say should be looked at in a scientific way.

VIC TANDYS INFRASOUND RESEARCH

Introduction

Vic Tandys work gives a scientific reason for some strange things that people might think are supernatural.

Tandy and Tony Lawrence wrote "The Ghost in the Machine" in the Journal of the Society for Psychical Research in 1998. Their article suggested that a 19-Hz wave, in the air under conditions could cause feelings and experiences that might be seen as a ghostly presence.

What is Infrasound?
Infrasound means very low-frequency sound, below 20 Hz.

It can come from things and from things people make such, as:

Strong winds
Earthquakes
Volcanoes
Storms
Large machinery
Ventilation systems
Industrial equipment
Transportation systems

Modern research also emphasizes that the effects of infrasound depend on factors such as frequency, sound pressure level and duration of exposure.

Tandy's Laboratory Experience

Tandy was working in a laboratory where people had reported experiences. He started to notice feelings himself. He felt a vibration in a metal fencing foil. It was not something he could explain. He began to investigate the lab environment closely. He thought about the ventilation system and the extractor fan. He believed it might be producing a low-frequency sound. He looked into the possibility of effects. His research led him to a standing wave, near 19 Hz. He thought this frequency could cause sensory experiences. He believed the vibrations might be affecting people's minds and bodies. It was not a sound but it could still have an effect. He shared his findings with others. He wanted to know if more people had felt the thing. He hoped his work could help explain what was happening.
Simple explanation
Extractor fan
↓
Low-frequency sound
↓
Standing wave
↓
Possible effect on sensory perception
↓
Unusual experience
↓
Person may interpret the experience as paranormal
Tandy and Lawrence specifically pointed out this as a natural reason for some reported ghost stories, rather than saying that all ghost stories are caused by infrasound.

Physiological Effects of Infrasound

Research on infrasound has looked at effects on the:

1. Nervous system
Very low-frequency sound and shaking may work with the senses. The effects depend a lot on how long and how strongly someone is exposed.

2. Vestibular system
Low-frequency shaking can possibly affect balance and the feeling of movement when the exposure is strong enough.

3. Cardiovascular system
Studies have looked at changes in how the heart and blood vessels respond under certain conditions.

4. Respiratory system
Strong low-frequency sound exposure might affect the way someone feels when breathing.

5. Psychological responses
Some studies have looked at:
Discomfort
Feelings of anxiety
mood
Trouble sleeping
Feeling tired

Recent experiments have found links between controlled infrasound exposure and negative feelings unpleasant reactions and higher levels of stress hormone in saliva. This does not mean that normal everyday infrasound always causes these things.
A major scientific review also says that reactions can be different depending on the frequency how loud it is, how long it lasts and how sensitive a person is.

Behavioral Evidence

This research matters because peoples experiences are personal.
For example several people, in a building might say:
They feel uneasy
They feel like someone is nearby
They feel anxious
They have feelings
They see things that're unusual
Instead of thinking right away that the place is haunted investigators can look at the environment.

Investigators can check:

- Environmental factors
- Machinery
- Fans
- Ventilation systems
- Vibrations
- Low-frequency noise
- Building acoustics
- Human factors
- Stress
- Fatigue
- Expectations
- Fear
- Previous knowledge of the location

This allows investigators to develop alternative hypotheses

Instrument-Based Investigation

A modern acoustic investigation can use instruments to measure the environment.
Basic procedure
1. Record the reported location
↓
2. Measure the acoustic environment
↓
3. Identify low-frequency components
↓
4. Locate possible sources
↓
5. Compare measurements with reported experiences
↓
6. Consider other explanations
↓
7. Reach a conclusion based on evidence

This is important because it changes an investigation from:
“People felt something strange.”
to
“Was there a measurable environmental factor that could have contributed to the experience?”
Importance to Forensic Science
Vic Tandys work shows an idea, in forensic science.
Always look for things that can be measured and seen before believing something

This does not mean that every strange feeling comes from infrasound. It means that the surroundings should be checked using science.
Forensic investigators should therefore consider:

- Acoustic measurements
- Environmental conditions
- Human perception
- Witness statements
- Physical evidence
- Alternative explanations

Overall Conclusion

- ·The Bell Witch, the Enfield Poltergeist and Vic Tandys research show ways that forensic science can be used on unusual and disputed events.
- ·The Bell Witch case shows how important forensic toxicology and document examination are. Even though the later story says that John Bell was poisoned the lack of toxicological evidence from the time means that the poisoning cannot be proven scientifically.
- ·The Enfield Poltergeist shows how useful forensic audio, photography and statement analysis can be. The case produced recordings and other materials but how to interpret those events is still disputed.
- Tandys research shows how acoustic measurements can help examine unusual human experiences. His work suggested that a low-frequency standing wave, near 19 Hz could in some situations cause experiences that people think are paranormal. Current research keeps looking at the body and mind effects of infrasound while stressing that reactions depend on how long and how intense the exposure's.

Final forensic principle

Evidence should be examined scientifically before a conclusion is reached.
These cases therefore provide examples of how toxicology, document examination, forensic audio, forensic photography behavioral evidence and acoustic measurements can be brought together when investigating unusual claims.

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RASHMI PURUSHOTHAM

THE SALEM WITCH TRIALS

A re-examination of the 1692 crisis through the lens of Claviceps purpurea and convulsive ergotism

An Affliction Without a Name

In April 1976, the journal Science published a short article by Linnda R. Caporael, then a doctoral candidate in psychology, titled "Ergotism: The Satan Loosed in Salem?" Caporael proposed that the strange behavior recorded in the Salem court documents was consistent not with demonic possession but with a case, or cluster of cases, of convulsive ergotism — poisoning caused by eating grain contaminated with the fungus Claviceps purpurea, commonly known as ergot.

Ergot thrives on rye and other cereal grains under specific environmental conditions: a cold winter followed by a warm, unusually wet spring and summer. Before the nineteenth century, farmers had no understanding that the small purple-black growths appearing on rye kernels, called sclerotia, were a toxic fungus rather than a normal part of the grain; the contaminated rye was harvested, milled, and baked into bread and porridge along with everything else. Caporael combed through colonial weather records and found that the growing season of 1691, the year before the first fits began, had indeed been unusually damp in the region around Salem Village — precisely the kind of weather that favors ergot growth on rye.
Ergot sclerotia contain a family of alkaloids, including ergotamine and lysergic acid derivatives chemically related to LSD, which is itself synthesized from an ergot alkaloid. When consumed in contaminated bread over time, these compounds can produce a disease historically known as St. Anthony's Fire, which occurs in two divisions.

From Witch Cake to Courtroom

The affliction did not stay confined to the Parris household for long. Within weeks, other young women in the village — twelve-year-old Ann Putnam Jr., seventeen-year-old Elizabeth Hubbard, and Mercy Lewis, a servant in the Putnam household — began exhibiting the same fits and complaints of invisible torment.
A neighbor, Mary Sibley, attempted a folk remedy rooted in English "white magic" traditions: she instructed Tituba, an enslaved woman in the Parris household, to bake a "witch cake" made of rye meal mixed with the afflicted girls' urine, then feed it to a dog, in the belief that the animal's reaction would reveal the identity of the witch responsible. The ritual backfired badly. Rather than calming the crisis, it appears to have accelerated it, and under mounting pressure from ministers and neighbors to name a culprit, the girls identified Tituba herself.

On March 1, 1692, magistrates John Hathorne and Jonathan Corwin examined Tituba alongside two other early suspects, Sarah Good and Sarah Osborne, in Salem Village's meetinghouse. Tituba, who historians believe had been beaten and coerced by Parris, delivered an elaborate confession describing a conspiracy with the Devil and naming Good and Osborne as fellow witches. Her testimony, rather than closing the matter, convinced the community that a much larger coven was operating among them, and the accusations spread outward through the summer, eventually engulfing respected church members like Rebecca Nurse and even, by autumn, a former minister's own wife.
It is against this backdrop of confession, contagion, and courtroom spectacle — nearly a dozen accusers, many of them adolescent girls and young women from the same tight social circle, feeding one another's testimony — that any physiological explanation for the crisis has to be tested.

CONVULSIVE ERGOTISM	GANGRENOUS ERGOTISM
Affects the central nervous system	Severe constriction of blood vessels (vasoconstriction)
Muscle spasms and violent convulsions	Burning pain in the limbs ("St. Anthony's Fire")
Vivid, often terrifying hallucinations	Tissue death (necrosis)
Crawling sensation under the skin ("formication")	Fingers, toes, or entire limbs blacken and may fall off
Delirium and mania	Skin discoloration
Tingling in fingers and toes	Circulation to the extremities cut off

Figure 1. The two recognized clinical patterns of ergot poisoning, as described in the historical and toxicological literature.

A Graduate Student's Hypothesis

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Matching Symptoms to the Court Record

Caporael's argument rested on a close reading of the depositions collected during the Salem trials, many of which describe symptoms that, read without the lens of witchcraft, sound strikingly medical. Afflicted girls reported being pinched, pricked, and bitten by invisible assailants — a description Caporael and later supporters connected to formication, the crawling, biting sensation on the skin associated with ergot alkaloids. Witnesses described convulsive fits in which the accusers' bodies twisted violently, their backs arched, and their limbs jerked in ways onlookers found impossible to fake.

The girls also reported visions: spectral figures of the accused appearing in their homes, in the rafters of the meetinghouse, and at the foot of their beds. These visions were treated by the court as "spectral evidence," testimony that the accused's specter, rather than their physical body, had appeared to torment the witness — evidence that would later be recognized as one of the central injustices of the trials, since it was essentially unfalsifiable.

Historian Mary Matossian offered further support for the ergotism hypothesis in the early 1980s, restating the case that the weather conditions of 1691 were consistent with a bumper crop of ergot, and noting that rye was a dietary staple in the region most closely associated with the initial accusations, the western part of Salem Village. Caporael also pointed out that the crisis effectively ended in 1693, a year in which historical records indicate a drought set in — conditions that would have made it far more difficult for ergot to propagate on the following year's rye crop, and which, in her view, help explain why the trials wound down when they did.

A Theory Under Fire

The ergotism hypothesis did not go unchallenged for long. Later in 1976, psychologists Nicholas P. Spanos and Jack Gottlieb published a detailed rebuttal in the same journal, systematically working through Caporael's claims and finding the evidence wanting on several fronts. Spanos and Gottlieb noted that convulsive ergotism, as documented in genuine historical outbreaks, tends to occur in populations suffering from vitamin A deficiency, a condition that made the nervous system more vulnerable to the alkaloids' effects. Salem Village, however, was an agricultural community with easy access to dairy products and, through nearby Salem Town's port, to fish and other imported foods rich in vitamin A — making the population an unlikely candidate for a large-scale ergotism outbreak.

The critics also pointed to gaps between the expected epidemiology of food poisoning and the actual pattern of accusations. If tainted rye bread were responsible, one would expect the illness to appear on a household-by-household basis, since families ate from the same stores of grain, and to affect men, women, and children without regard to age or sex. Instead, the afflicted were disproportionately young, unmarried women and girls, a demographic pattern that fits more comfortably with social and psychological explanations of the crisis than with a foodborne toxin.

Spanos and Gottlieb further noted the absence of classic ergotism symptoms from the court record: no accounts of gangrene, no widespread vomiting or diarrhea, and no reports of livestock — which would have eaten from the same grain stores — falling ill in a similar pattern. They also highlighted testimony indicating that several of the afflicted girls behaved normally until an accused person entered the room, at which point their fits would begin, a pattern of selective, apparently theatrical onset difficult to square with a toxin circulating in the bloodstream.

Nicholas Spanos returned to the subject again in 1983, expanding on the critique and arguing that Mary Matossian's defense of the ergotism theory failed to engage with the vitamin A evidence or with the testimony of Thomas Brattle, a contemporary Boston merchant and mathematician whose 1692 letter described several of the accusing girls as being in ordinary good health outside of their fits — a detail hard to reconcile with a genuine, ongoing case of food poisoning severe enough to cause hallucinations and convulsions.

Jan 1692	First fits: Betty Parris and Abigail Williams fall ill
Feb 1692	Village doctor cannot explain the symptoms; "the evil hand" suspected
Mar 1692	First accusations of witchcraft filed
Jun–Sep 1692	Court of Oyer and Terminer convenes; 19 hanged, 1 pressed to death
1693	Severe drought sets in (ergot cannot grow); trials collapse

Figure 2. Key dates in the Salem witchcraft crisis of 1692–1693.

Where the Evidence Stands Today

Modern historians of the Salem trials generally treat the ergotism hypothesis as an intriguing but ultimately unproven explanation, and most academic treatments of 1692 now favor a combination of social, political, and psychological factors: land disputes between the Putnam and Porter families, anxiety over Indigenous attacks on the frontier, the rigid religious culture of Puritan New England, and the specific dynamics of adolescent girls navigating a society that offered them almost no other avenue for social power or attention. Bernard Rosenthal's influential study Salem Story treats the ergotism theory as worth a careful page of discussion but not as a persuasive account of what actually happened in the village.

What the ergotism debate leaves behind, regardless of which side is right, is a useful case study in how toxicology and epidemiology can be brought to bear on a historical mystery, and in how difficult it is to diagnose a population three centuries removed through the incomplete and often contradictory lens of courtroom testimony. Caporael never claimed that ergot explained every accusation or every execution of 1692; she suggested only that it may have provided an initial, physiological spark for a crisis that religious belief, social tension, and courtroom procedure then fanned into a much larger and more destructive fire.

Whether or not tainted rye bread was on the table in Salem Village in the winter of 1692, the trials themselves remain a lasting lesson in what happens when a community has no framework for understanding suffering except the supernatural — and no mechanism in its courts to demand physical evidence before taking a life.

It is also worth noting that the ergotism hypothesis, however contested, opened the door to a broader and more productive line of inquiry: were there other physical or psychological conditions, beyond fraud and possession, that might explain outbreaks of "bewitchment" in early modern communities more generally? Subsequent researchers have proposed encephalitis lethargica, Huntington's disease, and even undiagnosed epilepsy as possible contributors to other witchcraft panics across Europe and colonial America, each case requiring its own careful weighing of medical plausibility against the surviving historical record. Salem remains the most thoroughly documented of these episodes, which is precisely why it continues to serve, more than three centuries later, as a testing ground for how far modern toxicology can — and cannot — reach back into the past.

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What the ergotism debate leaves behind, regardless of which side is right, is a useful case study in how toxicology and epidemiology can be brought to bear on a historical mystery, and in how difficult it is to diagnose a population three centuries removed through the incomplete and often contradictory lens of courtroom testimony. Caporael never claimed that ergot explained every accusation or every execution of 1692; she suggested only that it may have provided an initial, physiological spark for a crisis that religious belief, social tension, and courtroom procedure then fanned into a much larger and more destructive fire.

Whether or not tainted rye bread was on the table in Salem Village in the winter of 1692, the trials themselves remain a lasting lesson in what happens when a community has no framework for understanding suffering except the supernatural — and no mechanism in its courts to demand physical evidence before taking a life.

It is also worth noting that the ergotism hypothesis, however contested, opened the door to a broader and more productive line of inquiry: were there other physical or psychological conditions, beyond fraud and possession, that might explain outbreaks of "bewitchment" in early modern communities more generally? Subsequent researchers have proposed encephalitis lethargica, Huntington's disease, and even undiagnosed epilepsy as possible contributors to other witchcraft panics across Europe and colonial America, each case requiring its own careful weighing of medical plausibility against the surviving historical record. Salem remains the most thoroughly documented of these episodes, which is precisely why it continues to serve, more than three centuries later, as a testing ground for how far modern toxicology can — and cannot — reach back into the past.

Quick-Recall Summary

For the Ergot Theory (Caporael, Matossian)	Against the Ergot Theory (Spanos & Gottlieb)
Damp 1691 growing season favors ergot on rye	Vitamin A-rich diet (dairy, fish) makes outbreak unlikely
Symptoms resemble convulsive ergotism: fits, formication, visions	Illness did not follow households; mostly young, unmarried women and girls
Rye was a dietary staple in western Salem Village	No gangrene, no vomiting or diarrhea, no sick livestock recorded
1693 drought may explain the end of the crisis	Fits began only when the accused entered the room; Brattle described girls as healthy outside fits

Verdict: intriguing but unproven — most historians favor social, political, and psychological explanations.

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INVESTIGATION DOSSIER · CLASSIFICATION: PARANORMAL CLAIM

THE FOX SISTERS

and the “Spirit Knocks”

EXPLAINED
NATURAL CAUSE

SUBJECTS	LOCATION	FIRST REPORTED	CLAIM
Kate & Margaret Fox	Hydesville, New York	1848	A ghost answers by knocking

TIMELINE

1848 — Knocks reported

1851 — Buffalo doctors investigate

1888 — Margaret demonstrates

1889 — She takes it back

01 THE CLAIM

In 1848, two young sisters, Kate and Margaret Fox, told their neighbors that a ghost was living in their family's house in Hydesville, New York. They said it answered questions by knocking: one knock for yes, two for no.

People believed them, and the story spread across America. It became the start of the Spiritualist movement, where people held sessions to talk to the dead.

02 THE EVIDENCE

Knocking sounds heard in full rooms, with witnesses watching

☑ The knocks gave “answers” to questions, such as people's ages

☑ Nobody could see how the girls were making the sounds

03 THE INVESTIGATION

In 1851, a group of doctors in Buffalo studied the sisters. They believed the sounds came from the girls cracking their joints.

Other skeptics noticed the knocks stopped when the girls' legs and feet were held still.

04 THE OUTCOME

In 1888, Margaret stood on a stage in New York and showed the crowd when she did it: she cracked her toe joint, and the room filled with loud raps. She said it had all been a trick that started as a childhood prank.



05 THE TWIST

A year later she took it back. So we still can't say for sure what she really believed.

06 THE TAKEAWAY

A tiny sound, plus people who badly wanted to believe, grew into a whole religion.

> “I can’t explain it” is not the same as “It’s supernatural.”

FILE NO. 1848-FOX · STATUS: KNOCKS EXPLAINED · TESTIMONY DISPUTED

THE SILVER BRIDGE COLLAPSE AND THE MOTHMAN LEGEND: STRUCTURAL AND METALLURGICAL FAILURE ANALYSIS

Introduction

The Silver Bridge collapse is one of the most important structural failures in the history of American bridge engineering. On December 15, 1967, the U.S. 35 Highway Bridge connecting Point Pleasant, West Virginia, with Kanauga, Ohio, collapsed over the Ohio River.

Forty-six people died and nine were injured. Thirty-one of the 37 vehicles on the bridge fell with the structure. The National Transportation Safety Board's investigation identified a specific structural failure involving eyebar 330 and concluded that the initiating fracture resulted from the combined effects of stress corrosion and corrosion fatigue.

At approximately the same time in local history, Point Pleasant had become associated with reports of a mysterious creature known as Mothman. The creature was described by witnesses as a large humanoid or bird-like figure with glowing eyes. After the bridge collapse, the two stories became connected in popular culture, with some people interpreting Mothman as a warning or omen.

From a forensic engineering perspective, however, the bridge collapse has a documented physical mechanism that can be investigated independently of the Mothman legend.

The Mothman Reports

Reports associated with Mothman began in Point Pleasant in November 1966. According to historical accounts, several witnesses described a large, winged figure with bright or glowing eyes.

The reports received local newspaper coverage and later became the subject of books, documentaries, films and tourism.

The Smithsonian's Center for Folklife and Cultural Heritage describes Mothman as a cryptid whose existence remains unsubstantiated and discusses the creature primarily as a component of local folklore and storytelling.

The reports continued into 1967. After the Silver Bridge collapsed in December 1967, the Mothman story became increasingly associated with the disaster. Some later accounts characterized the creature as a warning or harbinger.

There is, however, no engineering or scientific evidence demonstrating a causal connection between the alleged sightings and the bridge failure.

The Silver Bridge

The Silver Bridge was an eyebar-chain suspension bridge constructed across the Ohio River. Its structural system incorporated interconnected steel eyebars. An eyebar is a tension member with an enlarged end containing a hole through which a pin passes. Multiple eyebars could therefore be connected through large pins to form suspension chains.

This design was structurally efficient but created a significant vulnerability: a failure at a critical connection could have catastrophic consequences because of limited redundancy.

The Collapse

At approximately 5 p.m. on December 15, 1967, the bridge suddenly collapsed. According to the NTSB, the initial structural failure occurred at eyebar 330, specifically in the lower limb of the eye at joint C13N in the north suspension chain on the Ohio side span.

The sequence was approximately:
Fracture of eyebar 330
↓
Separation of eyebar 330 from the joint
↓
Sister eyebar slipped from the joint pin
↓
North suspension chain separated
↓
Load redistribution became catastrophic
↓
Bridge collapse propagated
The NTSB reported that the center span, side spans and towers collapsed within approximately one minute.

What Is an Eyebar?

An eyebar is primarily a tension-carrying structural component. The end of the member contains an "eye" with a hole for a connecting pin. Several eyebars can be connected at a joint, allowing tensile forces to be transferred through the chain. The critical weakness is that a crack developing near the eye can have severe consequences.

The area around a pin connection can experience:
- concentrated stresses,
- repeated loading,
- corrosion,
- stress concentration,
- and crack initiation.
The Silver Bridge disaster demonstrated how a defect in a single critical component could initiate a much larger structural collapse.

The Metallurgical Failure

The NTSB concluded that the immediate cause of the collapse was a cleavage fracture in the lower limb of eyebar 330. The fracture resulted from a critical-size flaw that had developed during approximately 40 years of service through the joint action of stress corrosion and corrosion fatigue.

This conclusion is extremely important.
The bridge did not simply "break because it was old." Instead, a specific microscopic-to-macroscopic failure process occurred:

Corrosion
↓
Crack initiation
↓
Repeated structural loading
↓
Crack propagation
↓
Critical crack size
↓
Sudden fracture
↓
Loss of structural load path
↓
Progressive collapse

Stress Corrosion

Stress corrosion cracking occurs when a susceptible material is simultaneously subjected to tensile stress and a chemically aggressive environment.
The stress does not necessarily need to exceed the material's ultimate strength. A localized defect can progressively grow under conditions that would not cause immediate failure of an undamaged component.

The original NTSB report discusses evidence for stress-corrosion cracking as well as evidence for corrosion-fatigue mechanisms. Metallurgical examination of the recovered eyebar was central to determining how the crack developed.

Corrosion Fatigue

Fatigue is the progressive development of cracks under repeated loading. A bridge experiences changing loads from:
- traffic,
- vibration,
- wind,
- temperature changes,
- and other environmental effects.

Even when individual loads are below the material's ultimate strength, repeated loading can cause fatigue damage. When corrosion occurs at the same time, crack growth can accelerate. This is known as corrosion fatigue.
The NTSB investigation found evidence supporting this mechanism in the Silver Bridge failure. The examination of the fracture surface identified features relevant to both corrosion-fatigue and stress-corrosion processes.

Why Did Inspection Fail to Detect the Problem?

One of the most significant findings was that the critical flaw was located in an area inaccessible to ordinary visual inspection.
The NTSB stated that the flaw could not have been detected by inspection methods available at the time without disassembling the eyebar joint.
This is a crucial engineering lesson.
A structure can appear visually intact while containing a dangerous internal or concealed crack.
Therefore:
No visible defect ≠ no structural defect.
Modern engineering inspection programs use multiple techniques precisely because visual inspection alone cannot reveal every type of material degradation.

Metallurgical Examination of Eyebar 330

After the collapse, investigators recovered structural components and subjected them to detailed engineering and metallurgical examination.

The fracture surface of eyebar 330 contained evidence of the crack-growth process.

The NTSB report discusses microscopic examination of the fracture and notes evidence supporting corrosion-related cracking. Some crack regions showed transgranular characteristics, while other evidence was considered in evaluating stress-corrosion mechanisms.
This illustrates how forensic metallurgy works. Investigators do not simply ask:
«"Where did the bridge break?"»
They ask: «"Where did the fracture initiate, what material features are present, how did the crack propagate, and what conditions allowed it to reach critical size?"»

Why the Collapse Was So Rapid

Once eyebar 330 fractured, the structural system lost a critical part of the north suspension chain.
Because the structure had limited redundancy, the remaining components could not safely redistribute the load.
The NTSB reconstructed the collapse as beginning in the Ohio side span and progressing toward the West Virginia shore. The major structural components collapsed within approximately one minute.
This explains why people on the bridge had little opportunity to escape.
The speed of the collapse also helps explain why the event was so devastating despite the bridge having been standing for approximately four decades.

The Mothman Legend and the Collapse

The Mothman story became linked to the Silver Bridge after the disaster.
Historically, the association is understandable: reports of the creature had occurred in the same community before a major disaster, and the sightings largely disappeared from the local narrative following the collapse. The Smithsonian notes that some people came to view Mothman as a harbinger of the disaster.
However, temporal association is not evidence of causation. The bridge investigation identified a physical failure mechanism involving:
- a specific structural component,
- a specific joint,
- a specific fracture,
- corrosion-related crack development,
- and structural load redistribution.
No part of the engineering investigation identified an unexplained external force or a biological creature as a cause of the collapse.

Engineering Evidence Versus Folklore

The case is particularly useful for forensic science because it illustrates two different forms of explanation.
Folklore explanation: Mothman sightings → warnings → bridge disaster.
This is a cultural interpretation developed around eyewitness accounts and subsequent storytelling.

Engineering explanation: Corrosion-related crack → critical fracture of eyebar 330 → chain separation → loss of structural integrity → collapse.
This explanation is based on recovered physical evidence and engineering analysis. These two narratives should not be treated as equivalent forms of evidence.

Consequences for Bridge Safety

The Silver Bridge disaster had major implications for bridge inspection and public infrastructure safety. The investigation led to recommendations concerning bridge inspection and contributed to the development of stronger national approaches to bridge inspection. The NTSB identifies the Silver Bridge investigation as an important event in the development of national bridge inspection practices.

The disaster demonstrated that:
1. Critical structural members require systematic inspection.
2. Hidden corrosion can be extremely dangerous.
3. Fatigue can progressively damage structural materials.
4. Connections and joints require special attention.
5. Structural redundancy can influence whether a local failure becomes catastrophic.
6. Metallurgical analysis can reveal the mechanism of a structural failure.

Forensic Engineering Reconstruction

The Silver Bridge investigation can be understood through a standard forensic engineering sequence:
- **Scene examination**
- **Investigators document the collapsed structure and location of debris.**
- **Component recovery**
- **Important structural members are recovered for examination.**
- **Fracture analysis**
- **Investigators identify the likely origin and direction of crack propagation.**
- **Metallurgical analysis**
- **The steel's fracture characteristics and corrosion features are examined.**
- **Structural analysis**
- **Engineers reconstruct the loads and stresses acting on the structure.**
- **Failure-sequence reconstruction**
- **The initiating fracture is connected to subsequent structural failures.**
- **Causal determination**
- **Investigators establish the physical mechanism responsible for the collapse.**
- **The NTSB's conclusion was based on this combination of physical and engineering evidence.**

Conclusion

The Silver Bridge collapse and the Mothman legend are closely connected in American folklore, but they represent fundamentally different types of evidence. Mothman belongs to the history of Point Pleasant's eyewitness reports, local storytelling, folklore and popular culture. The Smithsonian describes the creature as an unsubstantiated cryptid and emphasizes its cultural significance to Point Pleasant.

The Silver Bridge collapse, by contrast, has a detailed forensic engineering explanation. The NTSB identified the initial failure as a cleavage fracture in the lower portion of eyebar 330. The critical flaw had developed through the combined action of stress corrosion and corrosion fatigue over the bridge's service life.

The case therefore demonstrates a fundamental principle of forensic science: A dramatic narrative may explain how an event is remembered, but physical evidence is required to establish how the event actually occurred.

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DID YOU KNOW?

1. Witnesses under threat often remember the weapon, not the face. Called the weapon focus effect, it shows attention narrowing onto a threat, which can weaken a witness's ability to identify the person holding it.

2. Ouija boards move without help from spirits. In 1853, Michael Faraday showed that table-turning came from tiny, unconscious muscle movements, now called the ideomotor effect. Participants genuinely feel they aren't moving it.

3. Soundwaves at exactly 18.9 Hz (infrasound) are inaudible to humans but can cause the fluid in the eyeball to vibrate. This specific frequency induces spontaneous feelings of severe anxiety, chills, and optical illusions—explaining the "ghosts" in many famously haunted houses.

4. Fear leaves a literal trace. When humans are terrified, their sweat contains unique chemical markers called chemosignals. Forensic psychology studies show that simply smelling "fear sweat" instantly triggers the fear centers in a bystander's brain.

5. The 19th-century boom in "spirit photography" wasn't supernatural. Opportunistic photographers like William Mumler secretly repurposed poorly cleaned glass photographic plates, causing the translucent "ghosts" of previous clients to bleed into the portraits of the living.

6. The fingerprints of a koala are so virtually indistinguishable from human fingerprints—even under an electron microscope—that they have actually confused investigators and contaminated crime scenes in Australia.

7. Due to a rare genetic condition called Chimerism, a person can carry two completely distinct sets of DNA. In a forensic investigation, a blood sample and a cheek swab from the exact same suspect could theoretically read as "two different people."

8. Luminol is famous for making washed-away blood glow an eerie blue in the dark. However, the chemical is easily tricked. It reacts just as brightly to bleach, copper, rust, and even horseradish.

CONFIDENTIAL

9. Faces in the Static Why do we see demons in shadows or hear whispered voices in white noise? It is a psychological survival mechanism called Pareidolia (or "matrixing"). When plunged into frightening environments, the brain frantically forces familiar patterns onto random visual and audio noise.

10. The Corpse Wax Phenomenon In damp, oxygen-depleted environments, a body can undergo saponification—a chemical process that turns human fat into a hard, soap-like wax called Adipocere. This eerie transformation can perfectly preserve physical evidence on a victim for centuries.



MARSH LIGHT & BLOOD MARK COMBUSTION CHEMISTRY

Introduction

FILE No. 18
Will-o'-the-Wisp
The light that has no lantern, and no one holding it.

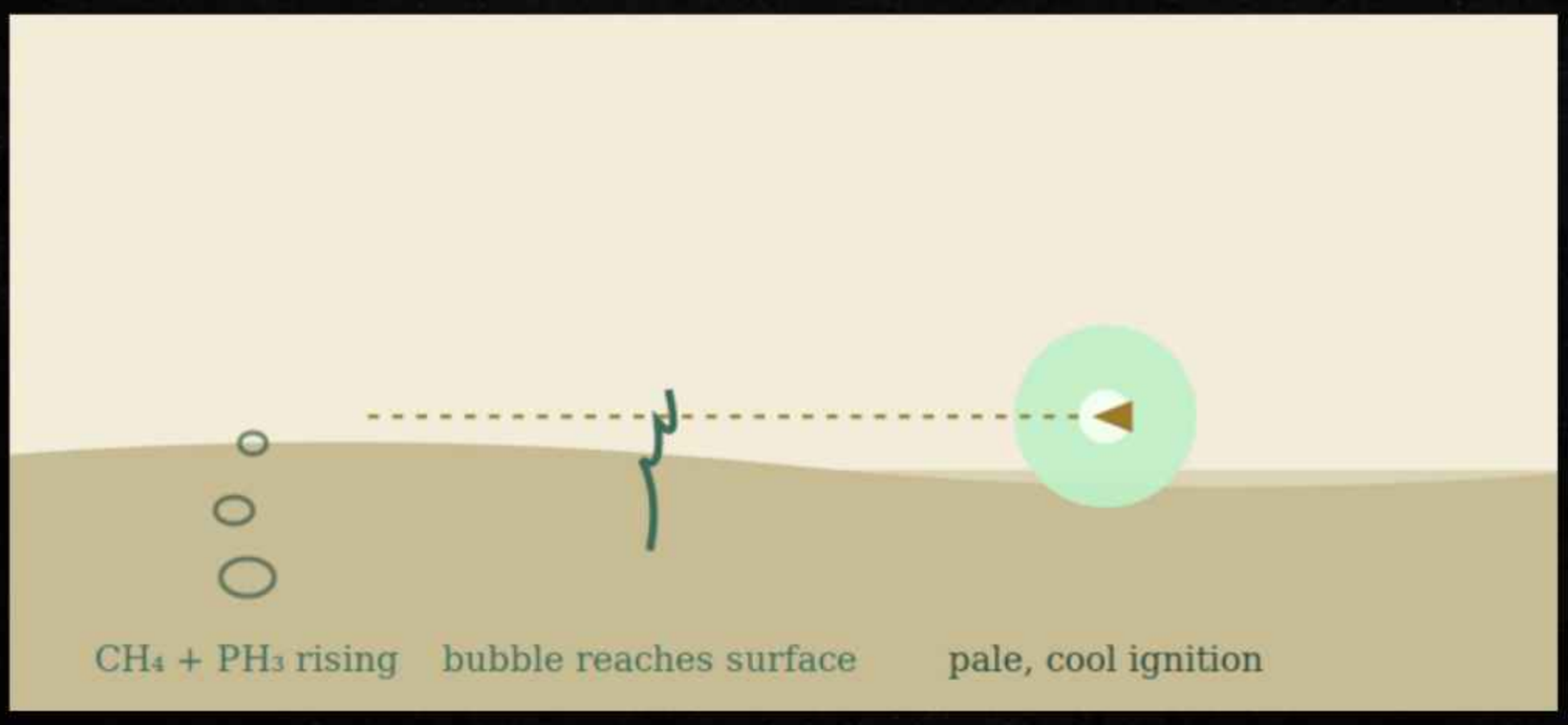


ignis fatuus — "foolish fire" — over standing marsh water

Travellers who crossed English fens and Louisiana bayous after dark have told the same story for centuries: a pale, cold flame hovering a few feet above the water, drifting away at precisely the rate one was able to approach it. It was blamed on fairies, restless spirits and the will of a wandering soul named Will who carried an ember from hell. It has, at various points, also been blamed on people - those who followed the light off a path and into a bog were not always to return to say what they'd seen. The last reason is why the phenomenon belongs in a forensic science course: a fire investigator who cannot explain a light at a scene is in danger of either dismissing evidence or building a case on none.

The Chemistry Underneath the Folklor

Marshland is a never-ending chemistry experiment. The bacteria responsible for breaking down decaying material in the waterlogged earth can't get the oxygen they need to perform aerobic decomposition, so they turn to a different set of biochemical processes that produce methane (CH_4), as well as trace amounts of phosphine (PH_3), from the breakdown of phosphate-bearing substances like bones and protein. The gases bubble up through the muck and into the atmosphere, but the mystery that has vexed researchers since the eighteenth century is not what those gases are — that's been established — but rather how they ignite into eerie blue flames without the benefit of a match, lightning strike, or any easily identifiable source of ignition anywhere near the swamp.



Marsh gas is mostly methane, but small amounts of phosphine and diphosphane (P_2H_4) escape alongside it. Pure phosphine does not self-ignite in air — the reaction only becomes spontaneous once it is contaminated with diphosphane.

Case File — 250 Years in the Making Chasing the Flame: A Timeline of Attempted Proof

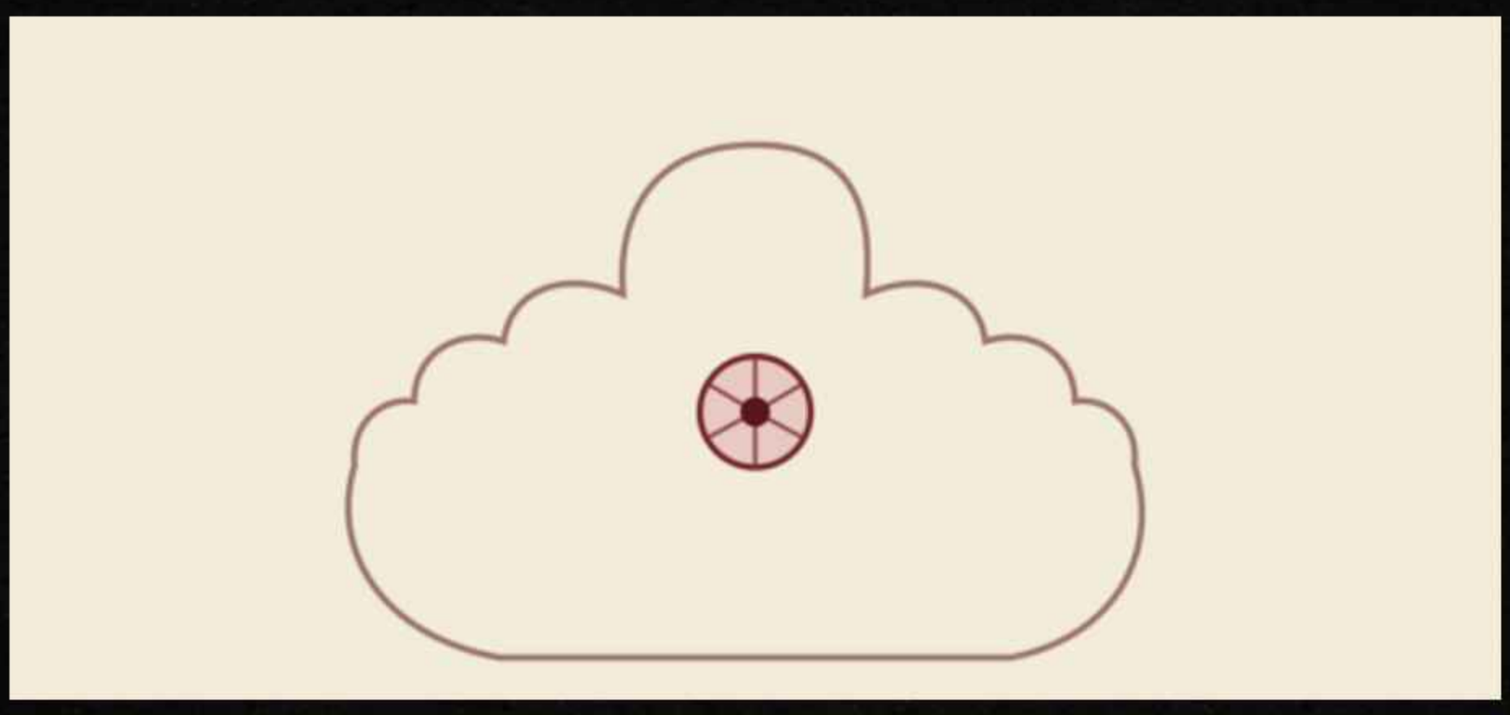
1776 Alessandro Volta — proposes that electricity, not the gas itself, provides the spark that ignites marsh gas — the first serious scientific theory, offered by the same chemist who later invented the battery.
1980s The phosphine hypothesis — gains ground: laboratory chemists show that phosphine gas contaminated with diphosphane (P_2H_4) will ignite spontaneously on contact with air, unlike pure phosphine alone.
2008–13 Luigi Garlaschelli and Paolo Boschetti — chemists at the University of Pavia, recreate a self-igniting flame from phosphine and air in the lab — but it burns green and smokes, while eyewitnesses describe a quiet bluewhite glow. The chemistry works; the colour doesn't match.
2025 Stanford chemists led by Richard Zare — propose "microlightning": colliding methane bubbles carry opposite electrical charges picked up from ions in marsh water, and the tiny spark that jumps between them may be enough to ignite the gas — no phosphine required.

No external source of ignition — like a struck match — is ever present at the marsh's edge. Something in the marsh has to be lighting its own fire. — the central problem every theory above was built to solve

The Forensic Angle

Fire investigators rarely get called to a haunted bog, but they are regularly called to landfills, sewage works, and old marshland that has been built over — all places where methane and phosphine keep accumulating exactly as they did under the reeds. When an unexplained flare-up or explosion happens at one of these sites, "spontaneous ignition of decomposition gas" has to be weighed as a genuine cause alongside faulty wiring, discarded cigarettes, or arson. Getting this wrong runs in both directions. Treat a genuine gas ignition as suspicious and an investigator can waste a case pointing at a person who did nothing. Treat a deliberately set fire as "just marsh gas" and a real act of arson goes unpunished. The chemistry in this file is the difference between the two conclusions — which is exactly why it is taught to forensic scientists rather than left to folklore.

FILE No. 19
Stigmata Phenomena : When the skin itself becomes the exhibit.

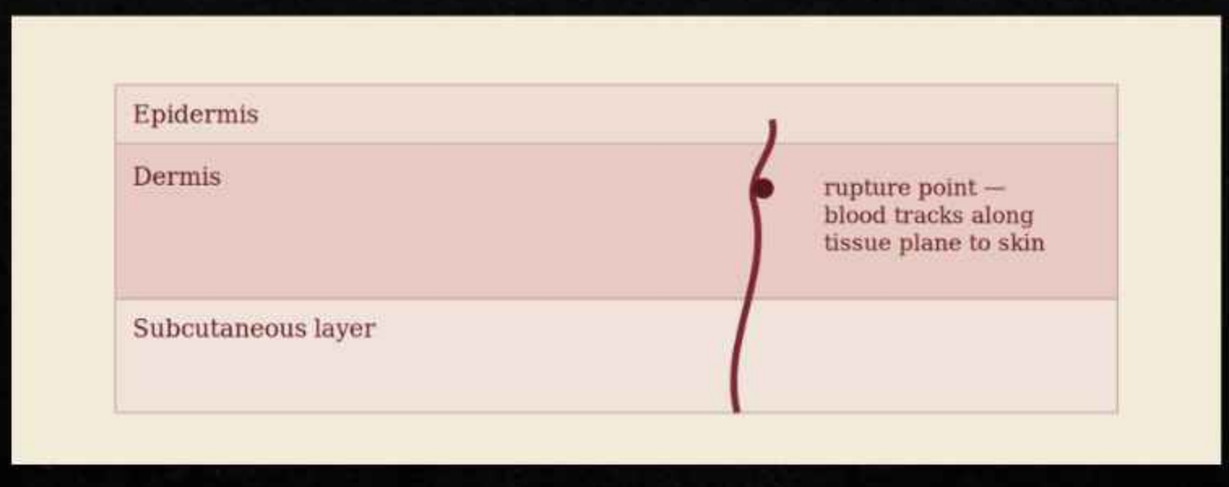


A wound presenting at the centre of the palm — the site most often described in stigmata cases, and the site examiners scrutinise most closely for signs of how it was actually produced.

Every few decades, the case crops up in the news; hands, feet, or foreheads bleed copiously without an obvious wound, frequently on Christian holidays, sometimes with tears of blood. The Church has investigated hundreds of such cases since the thirteenth century and formally accepted only a handful as inexplicable. Dermatologists, haematologists, and forensic pathologists have puzzled over the question in parallel: what is physically happening to this skin, and can it be distinguished, on a post-mortem examination, from a self-inflicted wound?

What the Skin Can Actually Do

Human skin has at least three well-established mechanisms by which blood or bruising may appear on skin without an obvious abrasion, and a forensic or dermatological examiner must rule all of them out before looking toward more esoteric possibilities.



In psychogenic purpura, red blood cells leak from small vessels without any break in the skin's surface, then track upward through tissue until blood appears at the surface — no cut is ever needed.

Psychogenic purpura (Gardner–Diamond syndrome). First described in 1955 by researchers Frank Gardner and Louis Diamond after they examined four women who presented with self-inflicted, inexplicable bruising, this rare disorder is now recognized as an autoimmune response against one's own red blood cells, often triggered by severe emotional distress. The resulting bruising and, in some cases, bleeding from the eyes or the skin can occur hours after a psychologically taxing experience and reappear in the same places. Less than 300 cases of it have been recorded up to 2025, while case report published this year documents an elderly patient whose blood-streaked tears — haemolacria — were ultimately determined to be a manifestation of this syndrome after infection and injury were ruled out.

Dermatographia and factitious dermatitis. One's skin can react to the slightest pressure by erupting in welts and redness in the shape of whatever has touched it — a condition known as dermatographia. On the other hand, factitious dermatitis encompasses self-inflicted wounds, whether accidental or otherwise, which can be made, aggravated, or concealed unconsciously in the wake of intense psychological distress. Both result in easily mistaken, at first glance, abnormal markings that are easy to explain upon closer inspection.

Case File — Documented Reports Three Cases
Three Different Answers

1918–62 Padre Pio — an Italian Capuchin friar, displayed wounds on his hands, feet, and side for over four decades. Church-appointed physicians examined him repeatedly; some biographers and researchers have since pointed to chemical explanations for how such marks could be maintained, while the Vatican's own investigations reached no single settled medical verdict.

1926–62 Therese Neumann — a German mystic, reportedly bled from her forehead and hands on Fridays for over thirty years while under periods of direct medical observation, including extended fasting studies that her examining physicians described as unable to fully explain.

1955 & 2025 Gardner and Diamond's original patients — and a 2025 case study of an elderly haemolacria patient, show the other end of the spectrum: spontaneous bleeding with a confirmed dermatological mechanism, reached through standard laboratory testing rather than theological inquiry.

The question an examiner asks is never "is this possible?" It is "which of the explanations that are already known to be possible fits this wound?" — the operating principle of forensic dermatology

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MYTh Vs FACTs

1	A WHITE FIGURE APPEARING IN THE DISTANCE MUST BE A SPIRIT.	MIST, REFLECTIONS, DUST, AND LIGHTING CAN CREATE GHOST-LIKE APPEARANCES.
2	A MYSTERIOUS FIGURE IN A PHOTOGRAPH PROVES PARANORMAL	A STRANGE IMAGE IS NOT PROOF OF A SUPERNATURAL PRESENCE.
3	FOOTSTEPS HEARD IN AN EMPTY ROOM ARE PARANORMAL EVIDENCE.	SOUND ALONE CANNOT ESTABLISH THAT A GHOST IS PRESENT.
4	LOOKING INTO A MIRROR IN DARKNESS CAN REVEAL SPIRITS.	LOW LIGHT AND PROLONGED STARING CAN DISTORT PERCEPTION.
5	SEEING A SHADOW FIGURE AT NIGHT MEANS A GHOST IS PRESENT.	HUMAN PERCEPTION CAN PRODUCE FRIGHTENING INTERPRETATIONS OF AMBIGUOUS SHAPES.

MYTh Vs FACTs

6

UNEXPLAINED SCRATCHES ON THE BODY PROVE DEMONIC ACTIVITY.

→

SCRATCHES HAVE MANY POSSIBLE CAUSES, AND THEIR APPEARANCE ALONE CANNOT IDENTIFY THE CAUSE.

7

FEELING A PRESENCE PRESSING DOWN ON YOU DURING SLEEP MEANS A SUPERNATURAL BEING IS ATTACKING YOU.

→

SLEEP PARALYSIS CAN PRODUCE FRIGHTENING SENSATIONS WITHOUT A PHYSICAL ATTACKER BEING PRESENT.

8

IF SOMEONE DIES AFTER BEING CURSED, THE CURSE MUST HAVE CAUSED THE DEATH.

→

THE SEQUENCE OF TWO EVENTS DOES NOT ESTABLISH CAUSATION.

9

HEARING A VOICE IN A RECORDING PROVES THAT SPIRITS ARE COMMUNICATING.

→

AN UNEXPLAINED SOUND IN A RECORDING DOES NOT ESTABLISH A SUPERNATURAL SOURCE.

10

A MYSTERIOUS BLOODY HANDPRINT IS A SUPERNATURAL WARNING.

→

A BLOOD-LIKE STAIN REQUIRES EXAMINATION BEFORE ITS ORIGIN CAN BE DETERMINED.

HAUNTED HOUSES AND CARBON MONOXIDE: TOXICOLOGY, MISDIAGNOSIS, AND HALLUCINATION

Introduction

Reports of "haunted houses" may also include a wide range of symptoms, including headaches, vertigo, nausea, confusion, weakness, visual changes, strange feelings, as well as sightings and sounds that no one else perceives.



There is one environmental hazard that has been scientifically proven to cause several of these symptoms: carbon monoxide (CO) poisoning.

Carbon monoxide is a colorless, odorless and non-irritating gas resulting from incomplete combustion. Sources within the home include furnaces, boilers, gas heaters, generators, fireplaces, stoves, and exhaust fumes. Since CO cannot usually be sensed by the human body, an individual exposed to this gas will not realize the danger until he or she experiences the symptoms.

However, it should be noted that reports of "haunted houses" are not necessarily caused by carbon monoxide. CO poisoning remains an important consideration in cases where there are multiple symptoms among the inhabitants of the same building.

1. Toxicological Mechanism

Carbon monoxide enters the bloodstream through the lungs and binds strongly to hemoglobin, forming carboxyhemoglobin (COHb).

This interferes with oxygen transport and contributes to impaired oxygen delivery. CO also affects cellular respiration, including mitochondrial processes. The brain and heart are particularly vulnerable because of their high oxygen requirements.

The simplified mechanism can be represented as:

CO inhalation
↓
CO binds hemoglobin
↓
Carboxyhemoglobin formation
↓
Reduced effective oxygen delivery
↓
Neurological and cardiovascular dysfunction
↓
Symptoms ranging from headache to confusion, loss of consciousness, and potentially death

2. Common Symptoms

According to the Centers for Disease Control and Prevention, the clinical signs of CO poisoning include headache, dizziness, weakness, nausea, vomiting, chest pain and confusion. In more advanced cases, changes in mental status, loss of consciousness, nervous system damage and even death may occur. These signs are often characterized as “flu-like” and this is a major diagnostic issue.

A person who is exposed to CO gas may think that they are suffering from:

- the flu,
- food poisoning,
- migraine,
- fatigue,
- dehydration,
- or some other illness.

In case of several patients who experience similar symptoms in the same place and within a relatively short period of time, the environmental factor should be taken into account Specifically, according to the CDC, one should suspect CO poisoning in cases of similar complaints of several patients or the presence of the source of exposure.

3. Why CO Poisoning Can Be Misdiagnosed

The diagnosis of carbon monoxide poisoning is difficult to establish due to the non-specific symptoms of CO poisoning.

Headache, nausea, tiredness, dizziness, and confusion appear in many different medical conditions. According to the Canadian Medical Association Journal, there is no unique finding or symptoms that will identify CO poisoning and make a diagnosis hard to make.

Seasonal issues may further complicate the process of making the diagnosis. For instance, during colder periods of time, CO poisoning and some viral diseases can increase in prevalence and thus cause confusion in the process of making a diagnosis.

Therefore, an environmental history becomes crucial.

Questions a physician needs to ask are the following:

- Are symptoms experienced indoors primarily?
- Are several patients affected at once?
- Do symptoms disappear outdoors?
- Is there any kind of heating system in the premises?
- Is there any running car in the vicinity?
- Is there enough ventilation?
- Was a CO detector sounding?

4. Carbon Monoxide and Hallucinations

The connection between CO and hallucination should be explained carefully in scientific terms.

Hallucination is not a symptom that characterizes common CO poisoning. Nevertheless, it is possible for there to be neurologic and behavioral problems in severe cases of such poisoning. Literature has noted cases of agitation, confusion, and hallucinations among other manifestations.

Therefore, when someone experiences seeing something unusual while suffering from suspected CO exposure, there are some factors that need to be taken into account.

The experience can possibly be associated with:

- visual hallucination,
- perceptual change,
- confusion,
- problems with the sensory processing system,
- misunderstanding of ambiguous stimuli,
- sleep-related phenomenon,
- some other neurological disorder,
- or an unrelated cause of psychological or environmental nature.

The forensic or clinical expert should not necessarily interpret the unusual experience as a hallucination or CO exposure at all.

5. Hallucination Versus Poisoning: A Differential Approach

The following forensic approach would be appropriate for such cases:

Step 1 – Identify the event
What was actually reported by the individual to witness, hear or feel?

Step 2 – Define the timing
Was the event experienced:
- before entering the building,
- during staying inside,
- right after exiting,
- or long time afterwards?

Step 3 – Check out the environment
Was there any CO?
Were there fuel burning devices?
Was there inadequate ventilation?
Were there any other combustion sources?

Step 4 – Review the medical data
Were there any compatible symptoms?
Was COHb levels tested?
Was there neurological or cardiovascular impairment?

Step 5 – Explore other causes
Could the event be caused by:
sleep paralysis, drug use, intoxication, neurological disorder, visual illusions, stress, or some other environmental cause?



Fig 26.2: Cherry pink colour—carbon monoxide poisoning

6. Carboxyhemoglobin as a Biomarker

Carboxyhemoglobin is a critical laboratory marker for carbon monoxide exposure.

It is possible to detect COHb either by a blood test or by the specific procedure called CO-oximetry. However, it needs to be understood that COHb decreases once the exposure ceases. Thus, the post-exposure sample will never show the highest level of COHb because the concentration has already decreased since then.

This is a key forensic concept:

A negative or relatively low measurement does not mean that it reconstructs the peak of exposure.

The time of sampling becomes crucial here.

7. Multiple Occupants: An Important Clue

Perhaps the most helpful clue in the case of environmental poisoning would be the simultaneous sickness of several individuals.

For instance:
"A family complains of headache, dizziness, nausea and confusion when in the house. Symptoms abate upon being outdoors for several hours."

Such a scenario should definitely prompt a suspicion of some kind of environmental threat.
In particular, the CDC states that symptoms of multiple people with similar ailments represent an indication for carbon monoxide poisoning.
Such scenarios are especially pertinent to the cases of haunted houses since the supernatural origin could easily be the first thing to come to mind.

8. Delayed Neurological Effects

CO poisoning may also cause delayed effects on health.

It has been seen that neuropsychiatric effects develop following acute CO poisoning. Cognitive dysfunction, memory impairment, personality changes, and psychomotor dysfunctions have been seen among those delayed effects. Those effects may take time to develop rather than showing up immediately.

Follow up is necessary in some cases.

The lack of immediate development of symptoms should not necessarily imply that there will be no later neurological effects.

9. Environmental Forensic Investigation

CO Poisoning Investigation: The environment must be systematically evaluated in the case of CO poisoning.

Potential sources:

- gas furnaces,
- boilers,
- gas water heaters,
- fireplaces,
- wood-burning stoves,
- generators,
- charcoal-burning devices,
- attached garages,
- automobile exhausts,
- inadequately vented equipment.

Documents

- CO detector reading,
- appliance condition,
- ventilation,
- exhaust venting,
- maintenance records,
- weather conditions,
- occupancy positions,
- symptom onset time,
- medical information, and
- laboratory results.

Scene preservation must be maintained prior to any alteration or repair of a ppliances where necessary.



10. Why the "Haunted House" Explanation Can Be Dangerous

The real risk is not in the paranormal explanation; it lies in the fact that the explanation will delay realization of a possible exposure to toxins.

If individuals think that their experiences have supernatural causes, they might not look into:

- a faulty furnace,
- a blocked flue,
- an operating generator inside,
- a car being run in the attached garage, or
- other sources of combustion.

Since CO is invisible and odorless, there is no point in waiting until someone smells something unusual.

11. Forensic Toxicology Perspective

An "apparent haunting" that involves physical or neurological symptoms must be investigated on the basis of a differential diagnosis paradigm:

Experience reported
↓
Medical symptoms
↓
Environmental investigation
↓
CO testing
↓
COHb and CO-oximetry as appropriate
↓
Alternative explanations
↓
Integrated conclusion

This approach avoids both extremes: automatically declaring a supernatural event and automatically declaring every unusual experience to be a hallucination caused by CO.



Conclusion

Carbon monoxide poisoning provides a prime example of how a seemingly mystical experience may be explained by a scientific and environmental factor.

CO can cause headaches, dizziness, weakness, nausea, confusion, and neurological symptoms, while very high levels of CO exposure lead to altered mental status, unconsciousness, and even death. Hallucinations may occur in cases of CO poisoning, but these are not the characteristic symptoms of the condition.

This is why the main forensic lesson from this condition is:

Before explaining unusual experiences in paranormal terms, the investigators need to first rule out possible environmental factors influencing the nervous system.

In the case of suspicious experiences, it is crucial to carry out an evidence-based examination of the environmental factor.

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THE AMITYVILLE HORROR: COURT DOCUMENTS AND FORENSIC DEBUNKING OF THE ALLEGED HOAX

Introduction

The Amityville Horror is perhaps the most famous instance of an alleged haunted house in modern times. It all started with a real crime, wherein Ronald DeFeo Jr., on November 13, 1974, murdered six members of his family at 112 Ocean Avenue, Amityville, New York. After being convicted of the murders, it took approximately thirteen months before George and Kathy Lutz decided to move into the house along with their three children. They stayed there for a period of just 28 days. The family of Lutz later claimed several bizarre incidents, such as unexplained smells, abnormal temperatures, weird sounds, movement of objects, physical assault, appearances, and demonic possessions. It is from the account of this family that the book titled "Amityville Horror" authored by Jay Anson in 1977, and the film in 1979, came into being. However, the case is especially interesting from the standpoint of forensic investigation in that it allows a comparison between testimonies and allegations and the evidence obtained. In subsequent inquiries, many discrepancies in the account were uncovered, and the lawsuits between the Lutz family and William Weber provided further documentation.

1. The Documented Crime The murders carried out by Ronald DeFeo Jr. are the most certain aspects of the Amityville legend. There were six people in the DeFeo family who were murdered inside the house in November 1974. The individual was sentenced to six consecutive life sentences after being found guilty. This fact is significant because the occurrence of a violent act in a specific place is an historical fact that does not necessarily mean the place became paranormal because of that event. Therefore, from a forensics perspective, the murders by DeFeo and the subsequent hauntings claimed by the Lutz family should be considered two distinct issues. 1. The Documented Crime The murders carried out by Ronald DeFeo Jr. are the most certain aspects of the Amityville legend. There were six people in the DeFeo family who were murdered inside the house in November 1974. The individual was sentenced to six consecutive life sentences after being found guilty. This fact is significant because the occurrence of a violent act in a specific place is an historical fact that does not necessarily mean the place became paranormal because of that event. Therefore, from a forensics perspective, the murders by DeFeo and the subsequent hauntings claimed by the Lutz family should be considered two distinct issues.

2. The Lutz Family's Claims In December 1975, George and Kathy Lutz purchased this house. According to their testimony, weird things started happening almost immediately after their moving there. This story contained claims concerning:- weird smells, - cold spots, - strange noises - damages to doors and windows that appeared to happen on their own, -green slime and black material - a lot of flies - sensations and assaults - levitation, - ghosts, - demonic presence. It was all supposed to be a true story. Nonetheless, further investigation revealed discrepancies between certain claims and physical/evidentiary data.

3. The 1977 Lawsuit The legal background is one of the most critical elements of the case. In 1977, George and Kathy Lutz brought legal action against William Weber, Paul Hoffman, and other people who were involved in writing about the alleged haunting. This legal action included disputes over, but not limited to, the publication of Lutzes' stories and names. This lawsuit led to counterclaims and was carried to the federal court in Brooklyn. According to the contemporary sources provided by The Washington Post, the legal battle surrounding the book included a dismissal of the Lutzes' claims against Weber by Judge Jack B. Weinstein and the out-of-court settlement of Weber's counterclaims. It is essential for the case since the testimony given during the trial can be compared to the story told in the book.

4. Judge Weinstein's Observation During the proceedings, Judge Jack B. Weinstein reportedly observed that "to a large extent the book is a work of fiction." Contemporary reporting attributed this observation to the judge after he had heard evidence concerning the competing claims. This statement should be interpreted carefully. It does not constitute a judicial finding that every experience described by the Lutz family was fabricated. Rather, it reflects the judge's assessment of the evidentiary material presented in the litigation and the relationship between the published book and the underlying events. This distinction is important in forensic writing because a court's comment should not be transformed into a broader conclusion than the record supports.

5. William Weber's Account William Weber was a lawyer for Ronald DeFeo Jr. in the murder case. Weber then got involved in the talks about the experiences of the Lutzes and the chances of writing a book about their experience. Weber stated in his later statements that this horror story had been created by the Lutzes together. It was one of the most well-known testimonies provided by people who doubted the case when he said that they "had created this horror story over many bottles of wine." But one still needs to consider what Weber has said from the context. At the time when he gave his testimony, there were legal issues between him and the Lutzes. His statements can be considered as evidence but not independent proof. Forensic investigation requires checking corroborative evidence, not just a witness statement.

6. The Physical Evidence Problem The strongest form of skepticism regarding Amityville was the evaluation of claims regarding physical events that, one would expect, would have physical evidence. For instance, reports indicate that there were substantial damages caused to doors, locks, hinges, and windows. According to investigators, the owners who came into possession of the property later on found the original hardware and no physical damages as reported. Another popular discrepancy refers to the hoof prints in snow. The weather report indicated that the weather conditions were unsuitable for the claimed event to occur. This brings us to an essential point of investigation in forensics: Any claim regarding a physical occurrence should have corresponding physical evidence. If the door is claimed to have been ripped off the hinges, the investigator should find: ● displaced hardware ● screw damage ● deformation ● broken wood ● paint disturbances ● tool markings ● any mechanical evidence Without such evidence, the claim loses its credibility.

7. The Priest and the Court Documents The involvement of a Catholic priest in the Amityville story came to be considered an integral element of the published version of the story. A made-up priest in the story appeared under the name of "Father Mancuso" in the book by Anson. Legal documents that have been reproduced by researchers concerning the Lutz-Weber lawsuit and that include the interrogatory answers concerning Father Ralph Pecoraro were referred to by investigators who believed that the priest's involvement with the Lutz family differed greatly from what the published version implied. This example of forensic document analysis is significant because it shows how a real individual's role may be distorted during the process of turning testimony into commercial material.

8. The Later Owners After the Lutzes moved out, the property was bought by James and Barbara Cromarty. The accounts given by the Cromartys in later times failed to confirm the extreme paranormals reported by the Lutzes. Joe Nickell, the skeptical investigator, mentions the existence of the original hardware of the house as being a strong proof against the claims made for supernatural damage. Thus, the accounts of later occupants serve as another comparison. Nevertheless, the lack of paranormal experiences from later occupants does not serve as scientific proof that the earlier occupants had no paranormal experience. It just proves that the latter could not recreate the earlier reported paranormals.

9. What Does "Forensic Debunking" Mean Here? In reality, the Amityville study can better be characterized as a series of contradictions and absence of independent confirmation rather than an "experiment" proving that "the house was not haunted." Types of evidence| Significance to forensics Testimony in court| Enables a comparison of different stories Interrogatories| Provide contemporary answers to claims Weather reports| Can test environmental claims Hardware in house| Can test claims of physical damage Later occupant testimony| Offers an independent comparison Published version| Showcases how the story was told Legal/fiscal documents| Offer information on motivations and conflicts Witness testimony| Provides stories but needs confirmation And this is another example of the need for triangulation—testing of a claim against several independent sources.

10. Was the Entire Story a Hoax? "Hoax" must be handled delicately. There is a lot of proof that several critical parts of the narrative had been made up, overstated, or at odds with reality. The story was referred to as a fiction by Weber, according to Judge Weinstein, while the investigators pointed out certain contradictions regarding weather conditions and physical damage. On the other hand, how much of each one of the members of the Lutz family believed, recalled, overstated, or even imagined each experience is not so easy to prove now. Thus, a forensic conclusion would have to be based on the evidence, not on guessing what went through the mind of each one involved.

Conclusion

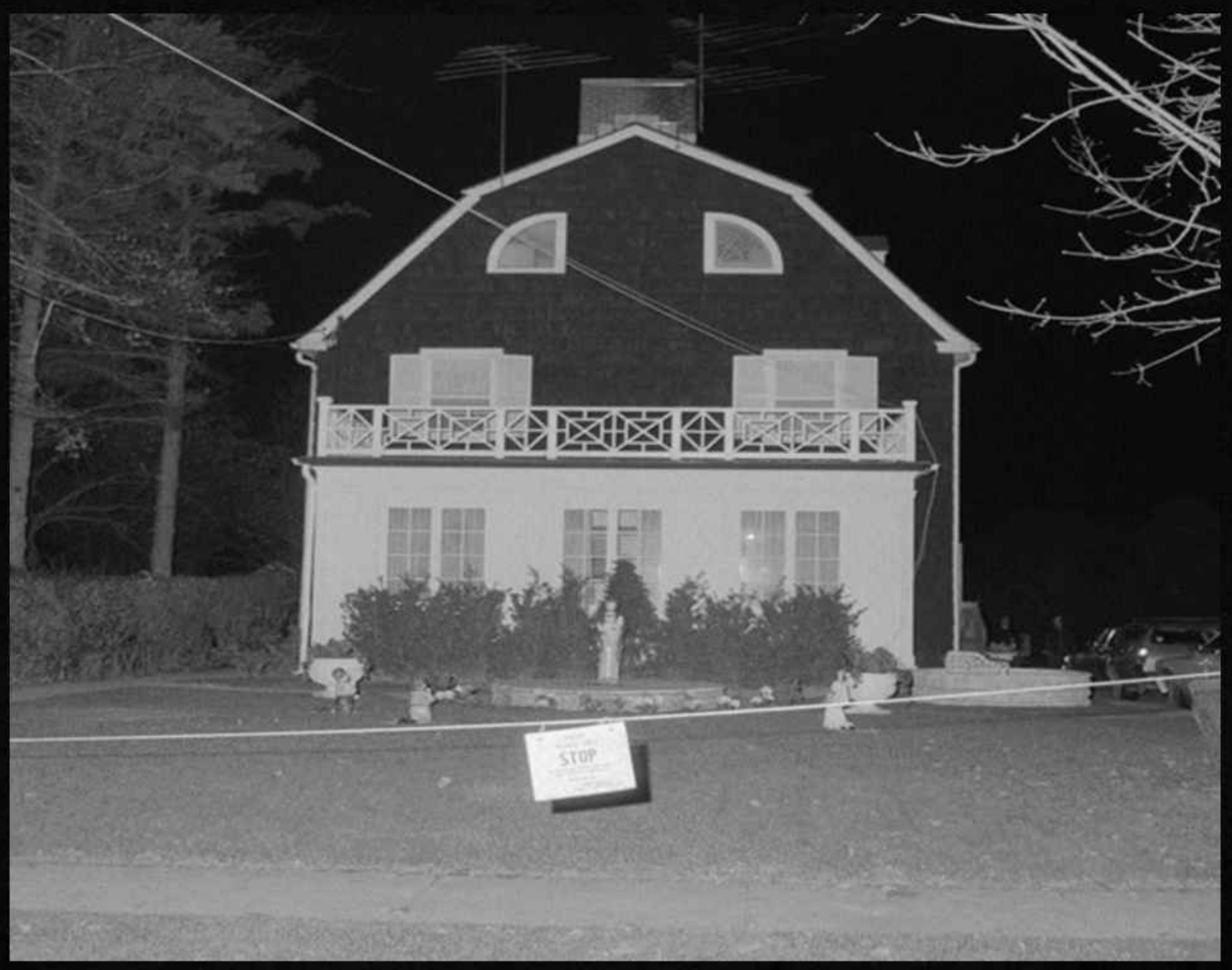
The Amityville Horror is useful for forensic studies because it illustrates how an extraordinary incident can be studied using regular evidence. The DeFeo murder case is a recorded criminal occurrence, but the Lutz family haunting story, which follows this case, is ridden with documentary and physical contradictions. The court trials, witnesses' testimonies, weather conditions, study of the property, and statements of people involved played a role in making this story controversial. The key lesson from forensics is that testimonies alone cannot prove an extraordinary event. It is necessary to find corroboration and make sure that the events fit the evidence.

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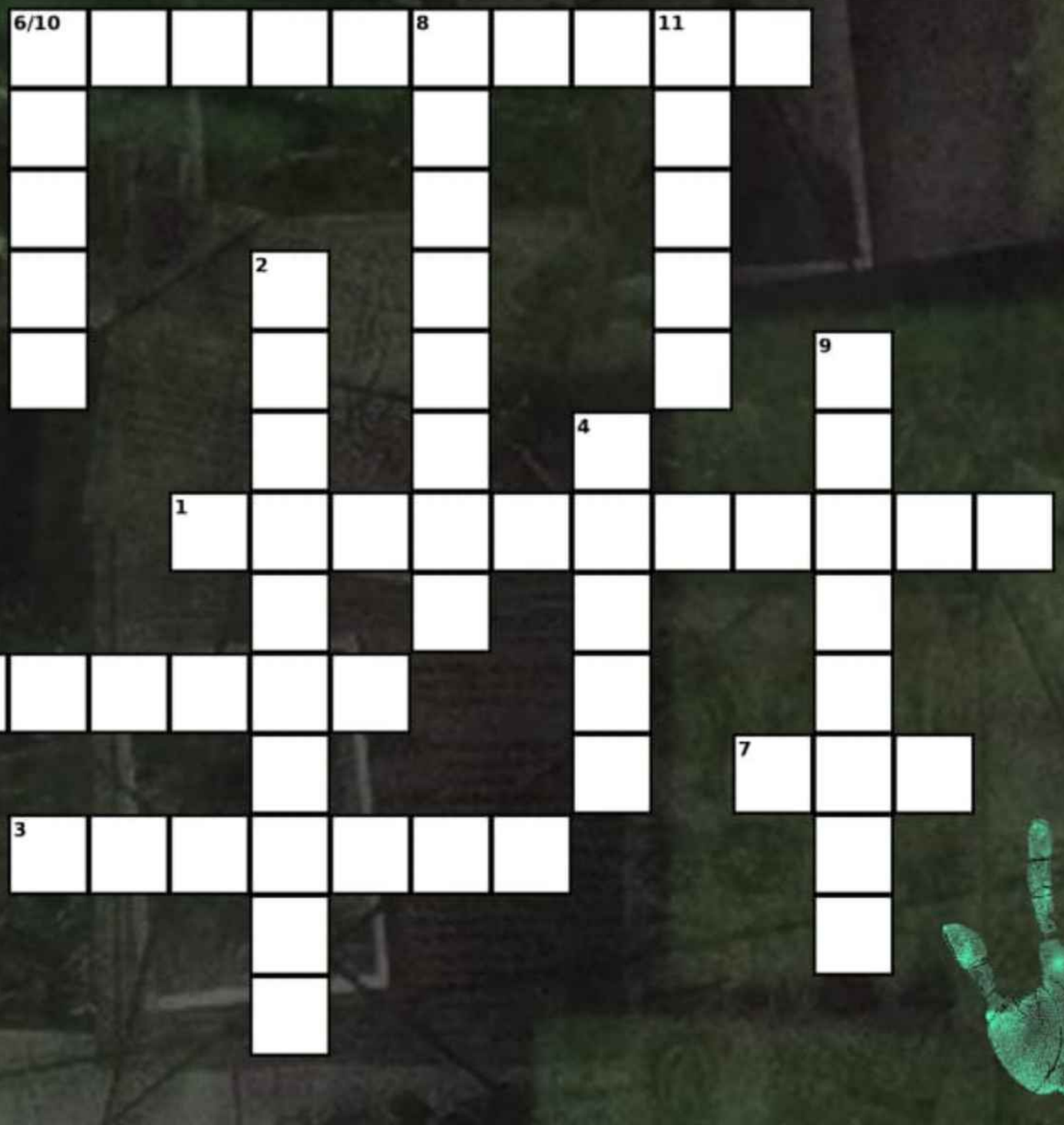


SHRI HASINI

CRIME BIAS.

Crossword Challenge

Can you find them all?



ACROSS

1. Unique ridge patterns for identification (11 Letters)
3. Post-mortem to find cause of death (7 Letters)
5. Chemical that glows with blood (7 Letters)
6. Study of bullets and firearms (10 Letters)
7. Genetic blueprint in every cell (3 Letters)

DOWN

2. Study of poisons and drugs (10 Letters)
4. Tiny evidence like hair/fiber (5 Letters)
8. Study of blood and fluids (8 Letters)
9. Object that proves a crime (8 Letters)
10. Common biological evidence (5 Letters)
11. Unlawful act (5 Letters)
12. Proof suspect was elsewhere (5 Letters)

THE NEW ENGLAND VAMPIRE PANIC

Exhumation Records, Tuberculosis Pathology, and the Forensic Evidence in the Grave

How consumption, cold storage, and post-mortem chemistry created New England's vampire folklore

Digging Up the Dead to Save the Living

Between the late eighteenth century and the closing decades of the nineteenth century, families throughout rural New England performed an activity that seems, to the modern eye, almost incongruent with the region's staid Puritan reputation: they dug up their own dead. Eighty or so such cases, more or less, according to Michael E. Bell, a folklorist who has been studying the phenomenon, have been reported in Rhode Island, Connecticut, Vermont, and Massachusetts, with the practice occasionally crossing the border into Canada. These were not acts of grave robbing or vandalism by outsiders. They were desperate, communal acts, sometimes even voted on by town selectmen, overseen by local clergy and physicians, carried out to stop what the families believed was an attack from beyond the grave.

The pattern of almost every case seems to follow the same general outline. A member of a family dies, typically having declined steadily for months from an illness, and in the succeeding months -- or years -- other members of the household begin to exhibit the same affliction: coughing that produces a sickly-tasting phlegm, fevers that come at nightfall, night sweats, and a generally wasting away that the Victorians called "consumption," because it seemed as if the sickness consumed the victim's body from within. The inability to explain the cause of an illness that appeared to jump from one afflicted person to another long after the initial death and burial was not unusual, and in fact led some communities to adopt an old folk belief (dating back to pre-Puritan European vampire legends) that the first family member to die had not really died at all and was rising from the grave at night to be drinking the life force of the still-living relatives who remained.

The rituals varied by town, according to Bell, but all followed a similar kind of format. Once the suspicion fell on a dead relative, the family (sometimes with the town's blessing, sometimes acting on their own, quietly) would dig up the dead relative and look for signs that he or she was in fact continuing to live: the lack of expected decomposition, liquid blood in the heart or other organs, or the growth of hair or fingernails since burial. If the signs were found, the remedy could take a couple of different forms. In many cases, the heart (or other organs) was cut out and burned, sometimes on a nearby rock or in a blacksmith's forge, mixed with a tonic, and given to the now-still-living, but sick relatives to drink. In others, the body was simply turned over on its face in the coffin, decapitated, or had their skeletons deliberately rearranged, on the belief that a corpse unable to orient itself could not travel to feed on the still-living. In 1854, the Ray family in Jewett City (in the Griswold, Connecticut area) exhumed and burned the remains of two of their brothers thought to be preying on a third; an earlier and oft-cited Vermont case, that of Frederick Ransom in Woodstock in 1817, followed a similar logic when his father had his heart removed and burned in a blacksmith's forge after other family members began falling ill.

Consumption: The Real Killer

The disease which was responsible for the New England vampire panic is tuberculosis. It is caused by the mycobacterium tuberculosis, an organism which was not identified before the last decades of the 19th century. This disease was killing people at an extremely high rate before the invention of antibiotics and modern treatment methods. It is believed that it was killing every 1 out of 800 or 1000 people in the period of the highest prevalence that Europe and the American continent have ever experienced. The contagion was spreading via the air, and it was especially rampant in the families where the disease could spread from one member to another due to the close quarters where they all lived, ate and slept, thus fueling the panic that the dead from the graveyard were following them and killing them little by little.

It was also a disease which did not show its symptoms right after the infection, but instead gave the victim a brief period of being healthy, after which it started suffocating its victim with coughing and other severe respiratory problems. Thus, it is possible to suggest that the disease had the most plausible grounds to be considered a supernatural phenomenon with some kind of will to pursue its victims. There were cases when the disease claimed several members of the family, first killing the mother, then a daughter, and then, after a decade of health and no symptoms, the son was diagnosed with tuberculosis. It certainly could give a frightened and superstitious XVIII century peasant quite a reason to believe that the vampires of his ancestors are pursuing him and his family. Especially due to the fact that there was no reasonable explanation for such patterns at that time since the germ theory had not been discovered yet.

The Exhumation of Mercy Brown

The best-documented case of the panic, as well as the one that provided the phenomenon with lasting notoriety, broke out in Exeter, Rhode Island, in the winter of 1892. George and Mary Brown had already lost their wife and mother, Mary Eliza, to consumption in 1883, and their eldest daughter, Mary Olive, the following year. Their son Edwin fell ill – and, as was customary for tuberculosis sufferers, went west to Colorado Springs, in search of a drier climate, but his health failed him nonetheless. Then, in January 1892, their youngest daughter, nineteen-year-old Mercy Lena Brown, died suddenly – and of an illness that ran its course over only a few days.

With Edwin's condition growing worse by the day, the neighbors convinced George Brown that one of his dead family members might be a vampire, drinking Edwin's blood from beyond the grave. And so, on March 17, 1892 – with the help of the local doctor, and a few of the neighbors, as well as a reporter from the Providence Journal – George Brown allowed the exhumation of his wife, his eldest daughter, and Mercy. The bodies of Mary Eliza and Mary Olive – both of whom had been laid to rest only years before – were moldering in their graves, just as one would expect of corpses that had lain there for so long. But Mercy's body, which had only been six months in its grave, during a New England winter, and which had been kept in an above-ground receiving vault or crypt, was – as it would turn out, unbeknownst to any of those present – integral to what they were about to see.

The doctor who was present, Dr. Harold Metcalf, noted that Mercy's body was not particularly decomposed, and that blood still remained in her heart and liver. To the men who stood at the grave – all of them operating under the assumptions of the region's vampire folklore – this was just the proof they needed that Mercy was a vampire, and that she was drinking Edwin's blood from beyond the grave. According to the custom of the area, Mercy's heart and liver were removed and burned on a nearby rock, and the resulting ashes mixed with water to form a tonic, which was then given to Edwin to drink, in the hopes that it would rid him of the vampire's influence. Edwin died two months later. Mercy Brown has since gone down in history – if not as "New England's last vampire" – then at least with some degree of mournful notoriety.

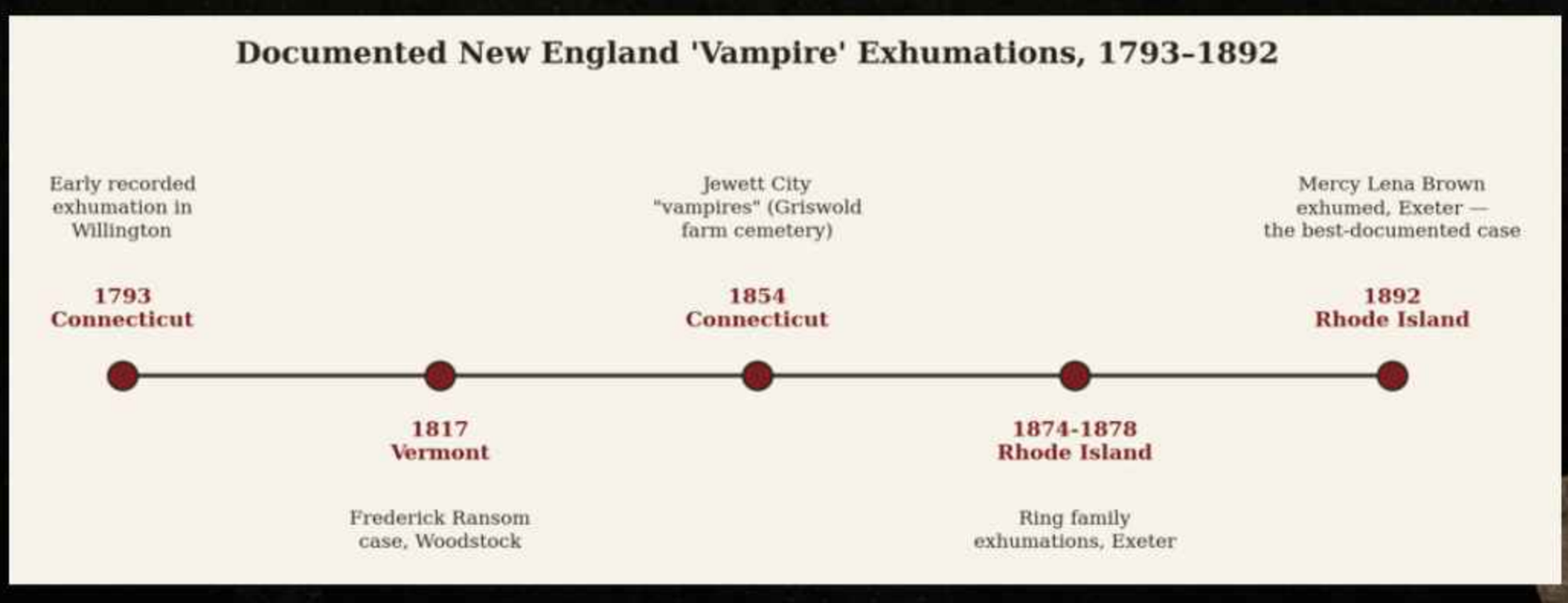


Figure 3. A selection of documented exhumation cases across the New England 'vampire' tradition.

Modern Forensics Reopens the Case: The Griswold and JB55 Excavations

For most of the twentieth century, the New England vampire panic remained a local legend and a curiosity for the grumblings of the press. However, that changed in 1990 when children began digging in a gravel pit in Griswold, Connecticut. Unearthing a human skull, police searched the area, but it wasn't long before the state's archaeologist, Nicholas Bellantoni, realized that the pit had nothing to do with any murder. Instead, a colonial-era family burial ground with graves dug in the eighteenth and nineteenth centuries was the real reason for the dig.
Of the nearly 29 graves excavated, one particular burial caught Bellantoni's eye. Inside a crypt of stones, he found a coffin secured with brass tacks on which were inscribed the initials "JB" with a "55," which he assumed stood for the age at death. Inside the coffin, the skeleton was dug up in a most particular manner. Specifically, the skull and thighbone had been "displaced to form a skull and crossbones over the chest of bones." After researching with the help of folklorist Michael Bell, he linked the disordered bones to the area's vampire exhumation traditions. These traditions held that family members who did not have the heart to burn the heart of a vampire return the body to the grave but remove the head and rearrange the bones "to prevent further visitations by the deceased."
Bellantoni surmised, based on the signs of a chronic lung infection, that the skeleton belonged to "a man named JB55" who had likely died of tuberculosis. The skeleton, in turn, had been linked by researchers to a vampire panic that had occurred in the 1850s, also known as the Jewett City vampires. As such, in 2019, a forensic genetics researcher led by Bellantoni published their work in the Genes journal, which linked JB55 to a man named John Barber. For now, it remains one of the few vampire graves that have been partially identified. Specifically, it remains the only vampire case to date that has been examined by modern medicine to determine the cause of death and even the potential identity of the dead.

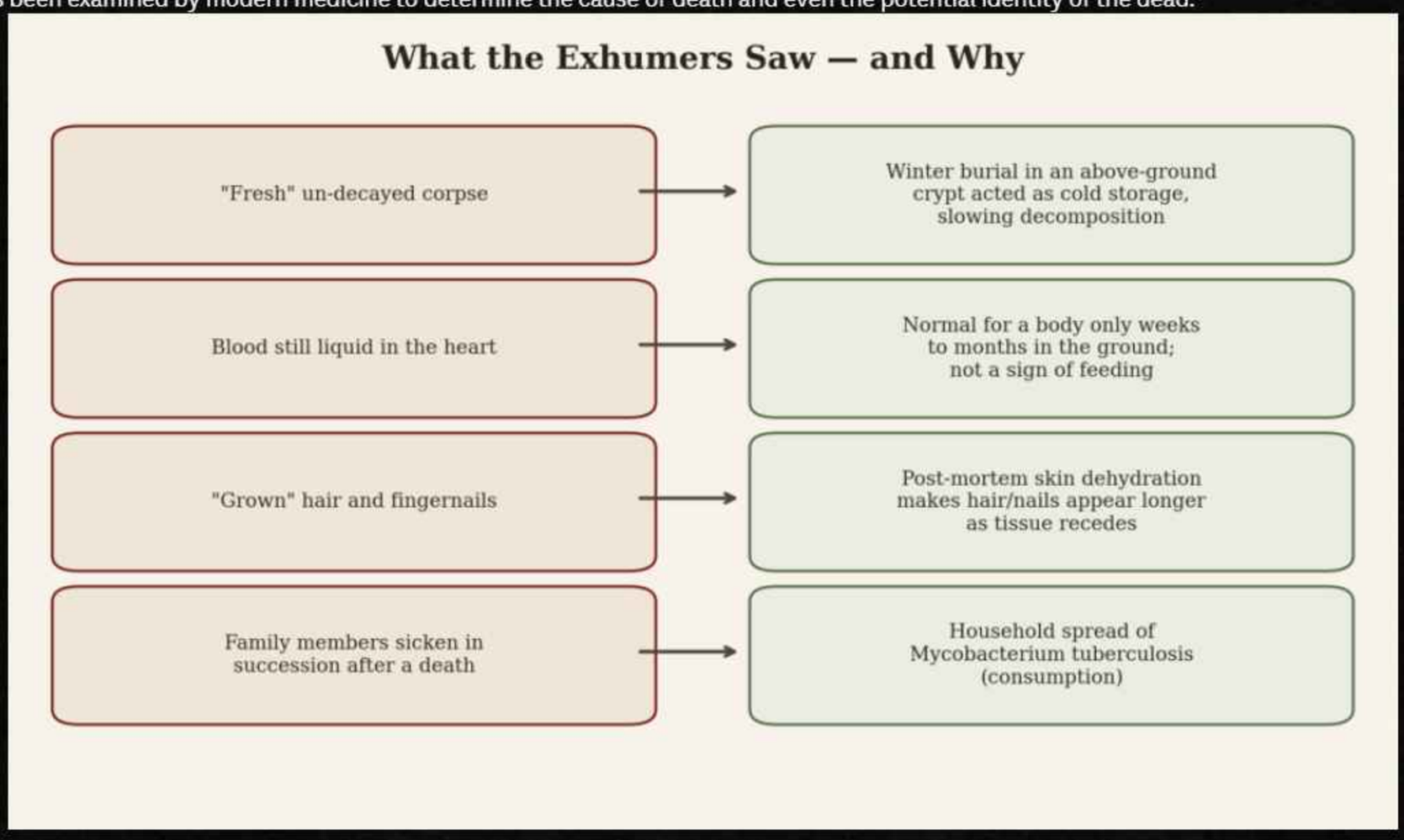


Figure 4. Folk interpretation of exhumed remains compared with the modern forensic and epidemiological explanation.

Reading the Grave Correctly

What forensic archaeology and modern pathology make clear is that nearly every physical sign that convinced nineteenth-century New Englanders they were looking at a vampire has a straightforward biological explanation. Bodies buried during the winter, when the ground was often too frozen to dig, were frequently kept in above-ground receiving tombs or stone crypts until spring — effectively refrigerating them and dramatically slowing the normal process of decomposition, exactly as happened with Mercy Brown, who had died in January and was examined only two months later, in March, after a New England winter. Liquid blood remaining in the heart and major organs is unremarkable in a body that has not been in the ground for very long, since blood does not clot or fully decompose on any fixed, dramatic timetable that would have been visible to an untrained eye in the 1800s. The apparent growth of hair and fingernails after death, reported in several exhumation accounts including Mercy Brown's, results from the dehydration and shrinkage of skin and soft tissue after death, which causes it to recede and expose more of the nail bed and hair shaft, creating the illusion of continued growth.
Behind all of it lay the very real, very lethal spread of tuberculosis through New England households, a disease responsible for a substantial share of all deaths in the region during the eighteenth and nineteenth centuries and one that would not be brought under control until the development of effective antibiotic treatment and public health measures in the twentieth century. The vampire exhumations, disturbing as they can appear from a modern vantage point, were in their own context a desperate, almost improvised form of public health intervention: a community with no germ theory, no bacteriology, and no antibiotics, reaching for the only explanatory framework it had left.

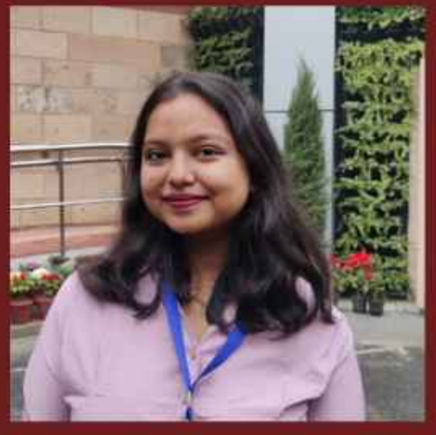
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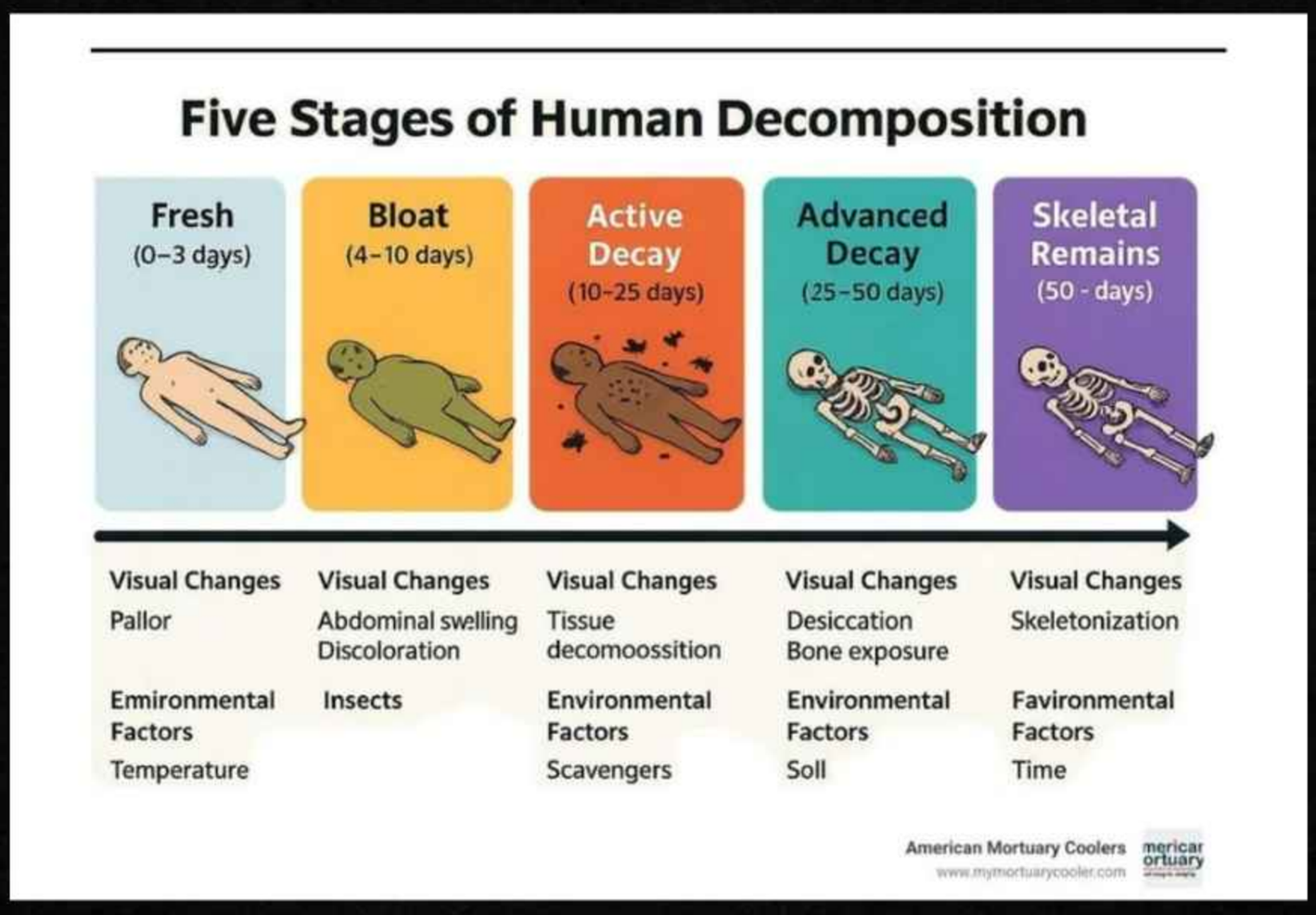
Vampire Folklore and Decomposition: A Forensic Pathology Explanation of the "Undead"

Introduction

Vampire folklore is one of the clearest historical examples of how normal postmortem changes can be misunderstood when their biological causes are unknown. Across parts of Eastern Europe and later New England, communities historically reported that certain dead individuals had returned from their graves to harm the living. Exhumed bodies were sometimes described as unusually well preserved, swollen, apparently blood-filled, or showing changes in hair and nails. These observations were interpreted as evidence that the deceased was still biologically active.
Modern forensic pathology provides natural explanations for many of these observations.
After death, the body undergoes a complex sequence of autolysis, putrefaction, gas formation, fluid movement, tissue breakdown, insect activity, dehydration, and skeletonization. These changes can substantially alter the appearance of a corpse. In particular, bloating, purge fluid, skin retraction, and changes in the appearance of hair and nails can create an impression of continued life or even "growth."
Historically, such observations became incorporated into vampire folklore. Modern forensic pathology demonstrates that they are consequences of decomposition rather than evidence of supernatural revival.

The Historical Vampire and the Dead Body

The modern vampire tradition developed particularly strongly in Eastern Europe, where reports of revenants—dead people believed to return from the grave—became especially prominent during the 17th and 18th centuries.
Historical vampire investigations sometimes involved exhumation of recently buried bodies. People were surprised when bodies appeared less decomposed than expected, when blood-like fluid was present around the mouth or nose, or when the body appeared swollen.
The famous 18th-century cases of Petar Blagojević and Arnold Paole illustrate this phenomenon. Historical reports described apparently fresh corpses and blood around natural openings, observations that were interpreted at the time as evidence of vampirism. Modern knowledge of decomposition provides alternative explanations for these findings.
The important forensic question is therefore:
What would a recently buried



What Happens to the Body After Death?

Death does not cause the body to instantly become biologically inactive. Several processes begin immediately. Major postmortem processes include:
Autolysis – enzymatic self-digestion of cells.
Putrefaction – microbial breakdown of tissues.
Gas production – microbial metabolism produces gases.
Fluid redistribution and purge – decomposition fluids may escape through natural openings.
Skin changes – discoloration, blistering and skin slippage occur.
Insect activity – insects consume and colonize decomposing tissues.
Desiccation – remaining tissues dry.
Skeletonization – soft tissue is progressively lost.
Forensic researchers commonly describe decomposition as a continuous process with recognizable stages such as fresh, bloated, decay, post-decay and skeletal/remains stages. [1]
However, these stages should not be treated as a rigid clock. Temperature, humidity, clothing, burial conditions, body size, access by insects, microbial activity and other environmental factors can substantially change the rate of decomposition. [2]

Bloating: Why Did the "Vampire" Look Swollen?

One of the most important forensic explanations for vampire folklore is postmortem bloating.
During putrefaction, microorganisms break down tissues and produce gases including: Carbon dioxide, Methane, Ammonia, Hydrogen sulfide, and other volatile compounds.
As these gases accumulate within body cavities and tissues, the body can become visibly swollen. The abdomen may enlarge considerably, while the face and external genitalia may also become distended. [3]
To someone without knowledge of decomposition, this could produce an appearance resembling: "The corpse has become larger." Historically, that could easily be interpreted as the body having consumed blood or food after death.
In reality, the enlargement is primarily associated with gas accumulation and tissue changes.

The "Vampire" Body Was Sometimes Actually a Diseased Body

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Historical vampire panics often occurred during periods of infectious disease.
One of the best-known examples is tuberculosis.
In 18th- and 19th-century communities, multiple members of the same household could die sequentially from tuberculosis. Before germ theory became established, communities sometimes interpreted the deaths as evidence that an earlier deceased family member was returning to attack the living.
Smithsonian historical research documents numerous New England vampire cases associated with tuberculosis outbreaks. [4]
This creates an important historical sequence:
Person dies
↓
Other family members become ill
↓
Additional deaths occur
↓
Community searches for an explanation
↓
Dead individual is blamed
↓
Body is exhumed
↓
Normal decomposition changes are observed
↓
Changes interpreted as evidence of vampirism
Modern epidemiology provides a completely different explanation for the clustering of deaths.

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Case Example: John Barber ("JB55")

One particularly interesting American case involved a body historically associated with a suspected vampire.
A skeleton marked "JB55" was discovered in Connecticut. Historical evidence suggested that the individual had been subjected to an anti-vampire ritual after death.
Modern forensic research eventually identified the individual as John Barber, a 55-year-old farmer who had died of tuberculosis. Researchers used DNA analysis and genealogical investigation to identify him.
This case demonstrates how modern forensic science can revisit historical mysteries using:
Skeletal examination,
DNA analysis,
Genealogy,
Historical documentation,
And archaeological context.
The historical interpretation was "vampire."
The modern interpretation identifies a deceased human being and reconstructs aspects of his life and death through scientific evidence

Why Did People Think the Dead Were Moving?

Some vampire folklore included the idea that a corpse could move or make noises.
Again, decomposition can provide natural mechanisms for unusual sounds or movements.
Gas accumulation and subsequent release can produce:
Sounds,
Movement of tissues,
Changes in body position,
And occasionally dramatic mechanical effects.
As decomposition progresses, gas pressure can alter the body's position or force fluids and gases through natural openings.
This does not mean a corpse is "alive."
It demonstrates that a dead body can undergo physical changes after death without consciousness or biological life.

The Forensic Importance of Decomposition

investigators must distinguish postmortem changes from injuries that occurred while the person was alive.
Decomposition can:
Obscure wounds,
Alter skin color,
Create fluid leakage,
Produce bloating,
Cause skin slippage,
Destroy soft tissues,
And modify the appearance of injuries.
Research has demonstrated that postmortem changes can be mistaken for traumatic injuries and consequently influence the decision to conduct a forensic autopsy.
Therefore, decomposition is not simply an indicator of "how old" a body is.
It is also a major factor in interpreting the cause and circumstances of death.

Decomposition and Estimation of the Postmortem Interval

Forensic investigators can use decomposition to help estimate the postmortem interval (PMI)—the period between death and discovery or examination.
Observable features can include:
Body temperature,
Lividity,
Rigor,
Skin discoloration,
Bloating,
Skin slippage,
Purge,
Insect activity,
Tissue destruction,
Mummification,
And skeletonization.
However, decomposition does not operate according to a universal timetable.
Temperature is particularly important, along with environmental conditions and access by insects and microorganisms. Modern forensic research emphasizes that PMI estimation remains subject to uncertainty and is best approached using multiple independent indicators rather than a single visual feature.

Vampire Folklore Through a Forensic Lens

The traditional vampire narrative can therefore be compared directly with known postmortem phenomena:
Vampire folklore observation
Forensic explanation
Corpse becomes swollen
Putrefactive gas accumulation
Blood appears around mouth
Postmortem purge / decomposition fluid
Body appears to have “fed”
Bloating and fluid changes
Hair becomes longer
Skin dehydration and retraction
Nails become longer
Retraction of skin around nail beds
Skin appears to peel and reveal “new” skin
Skin slippage and decomposition
Corpse appears unusually fresh
Environmental variation in decomposition
No obvious decomposition odor
Burial/environmental conditions may alter decomposition
Body makes noises
Gas movement/release and postmortem physical changes
Blood appears liquid after burial
Breakdown and redistribution of body fluids
Multiple family deaths
Historically, often associated with infectious disease outbreaks
These observations demonstrate why forensic pathology is particularly useful when examining historical supernatural claims.

From Folklore to Forensic Science

The history of vampirism illustrates a broader transition in human understanding.
Earlier interpretation
Unexplained death → supernatural explanation
Modern forensic interpretation
Unexplained death → evidence collection → medical examination → environmental investigation → pathological analysis → scientific explanation
The transition from folklore to forensic pathology did not occur simply because people stopped telling supernatural stories.
It occurred because medicine, microbiology, pathology, chemistry and forensic science provided mechanisms capable of explaining observations that previously appeared mysterious.

Conclusion

Vampire folklore provides a fascinating historical example of how normal postmortem phenomena can be interpreted as supernatural activity. Bloating can make a corpse appear to have become larger. Putrefactive gases can cause abdominal and facial swelling. Decomposition fluids can escape through the mouth and nose and appear blood-like. Skin dehydration and retraction can make hair and nails appear to grow, even though neither actually grows after death. Skin slippage can create the impression of a new layer of skin, while environmental conditions can significantly alter the expected rate of decomposition. ﷺ
Historical vampire panics were also sometimes associated with outbreaks of infectious disease, particularly tuberculosis. Communities lacking modern knowledge of microbial disease could interpret successive deaths as evidence that the deceased were returning to attack the living. ﷺ
From a forensic pathology perspective, the vampire provides an important lesson:
The appearance of a corpse is dynamic, and postmortem changes can produce remarkably misleading visual evidence.
What once appeared to be evidence of an undead body can, when examined through modern forensic pathology, be understood through autolysis, putrefaction, gas formation, fluid redistribution, dehydration, microbial activity and environmental taphonomy.



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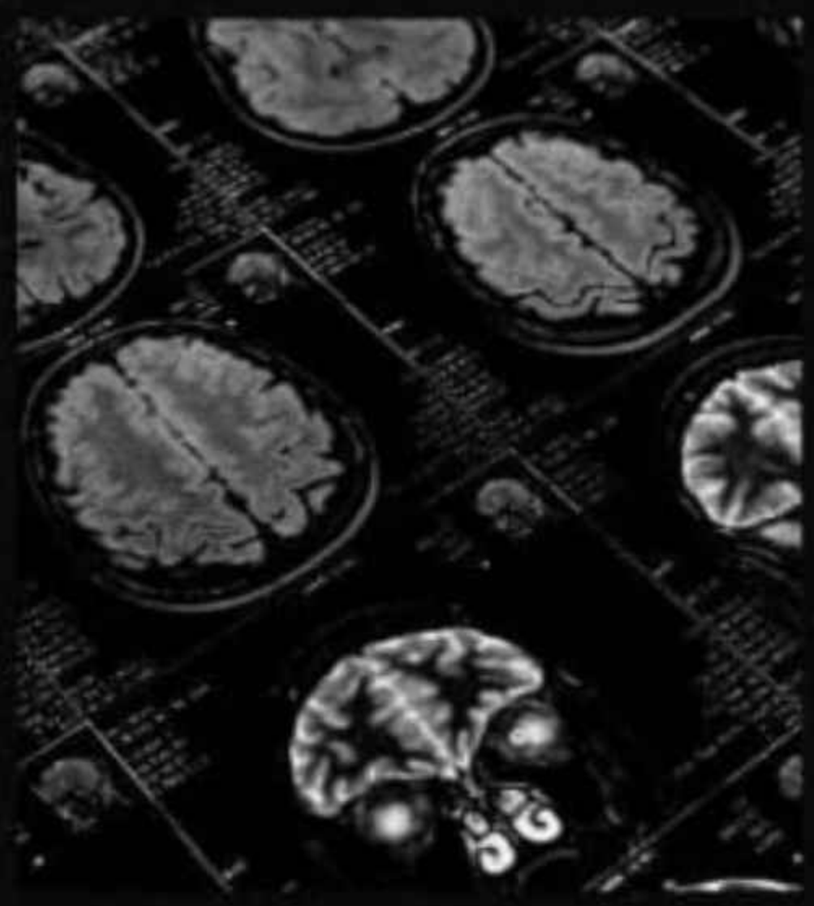
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THE PSYCHOLOGY OF FEAR



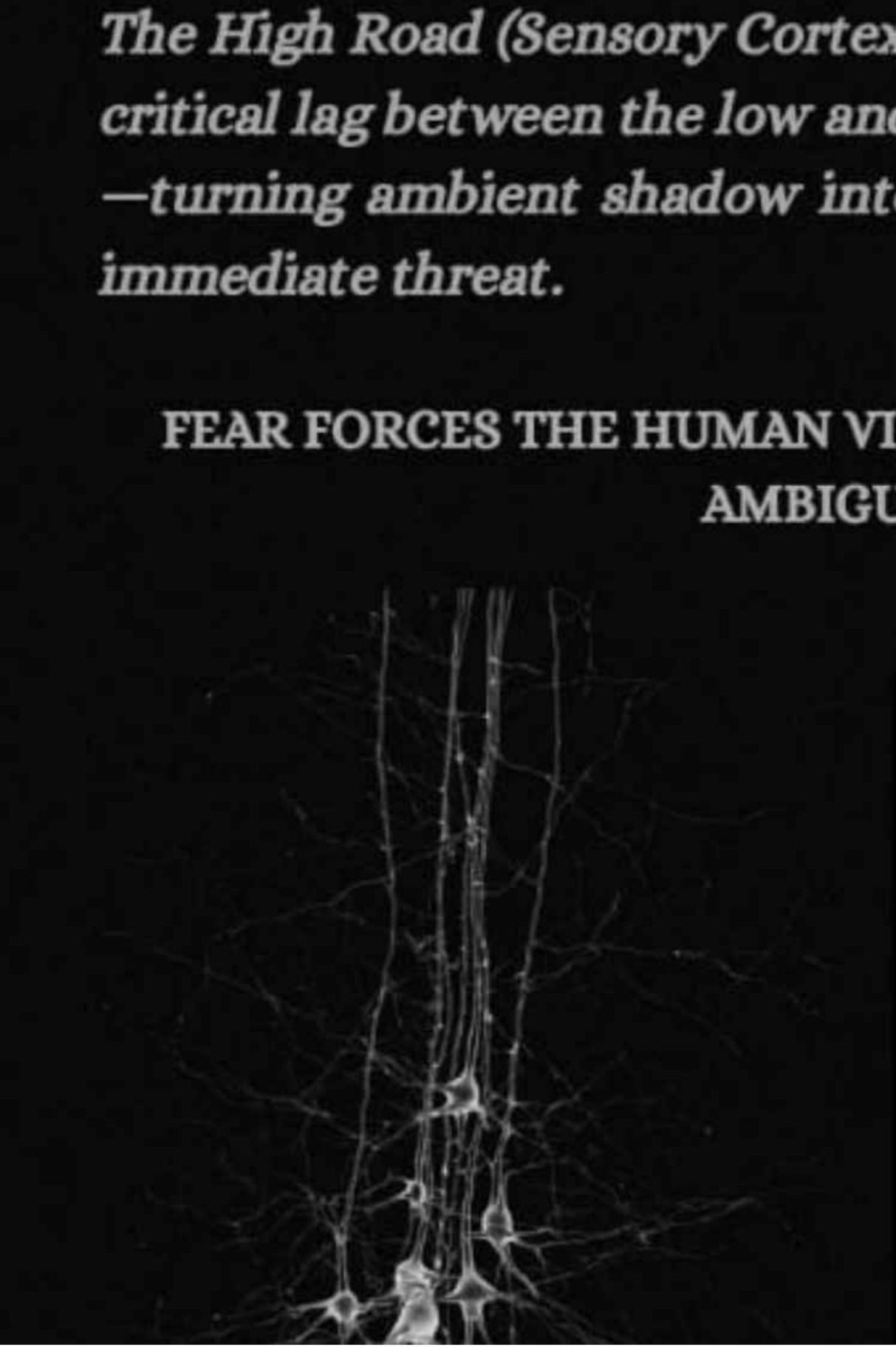
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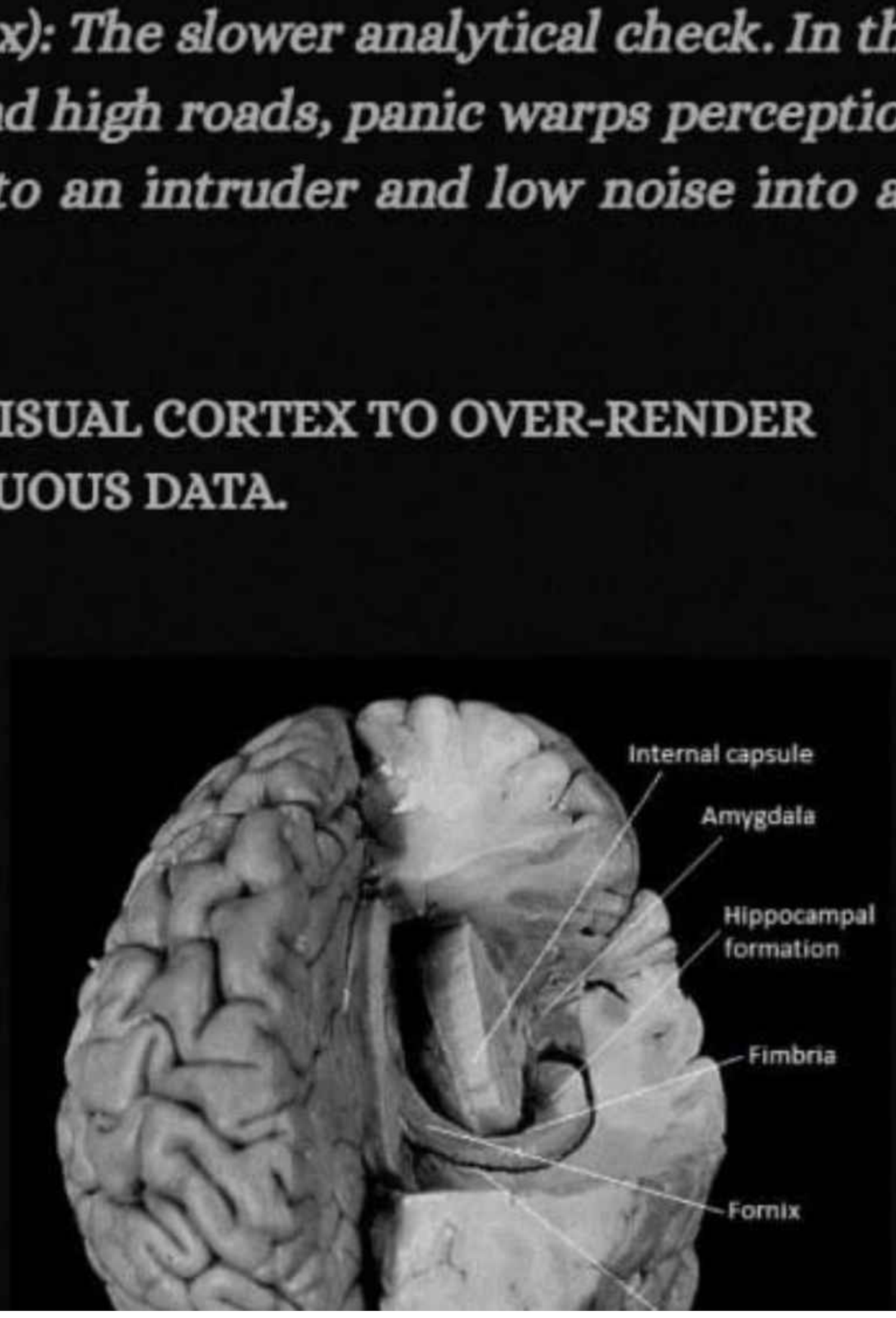
Fear is not an abstract concept; it is an immediate neurochemical ambush.

The Low Road (Thalamus to Amygdala): Bypasses rational thought entirely. Within milliseconds, noradrenaline floods the system to force survival behavior before the conscious mind can register the stimulus.

The High Road (Sensory Cortex): The slower analytical check. In the critical lag between the low and high roads, panic warps perception —turning ambient shadow into an intruder and low noise into an immediate threat.

FEAR FORCES THE HUMAN VISUAL CORTEX TO OVER-RENDER AMBIGUOUS DATA.





TYPES OF FEAR



1. REAL FEAR

Triggered by an actual threat (e.g., a loud noise, a dangerous situation).
It's protective and usually fades once the danger is gone.

2. ANXIETY

Often comes from uncertainty or future-related worries. It can be persistent and may not have a clear cause.

3. PHOBIAS

Intense, irrational fear of specific things, places or situations (e.g., heights, spiders, closed spaces).

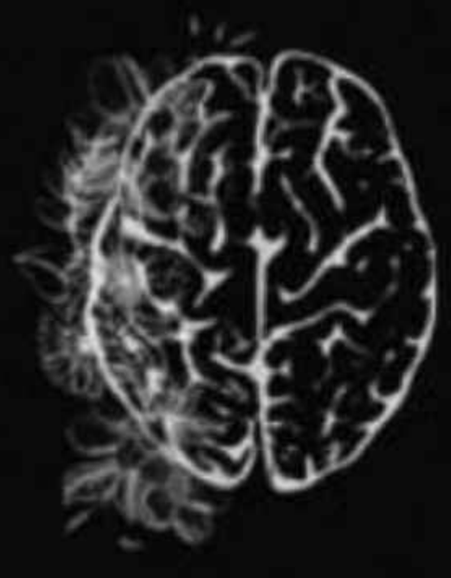
4. TRAUMA-BASED FEAR

Develops after a distressing experience. It can resurface through triggers, flashbacks or even physical reminders.

5. EXISTENTIAL FEAR

A deeper, sometimes unconscious fear of the unknown — like death, loss or losing control.





"NOT ALL FEAR LOOKS THE SAME.

HOW FEAR WORKS



"Fear is a complex response involving your brain, hormones, body and past experiences."

01 — THE TRIGGER

It could be a real threat, a memory, or even just a thought. Your brain notices something that feels dangerous — even if it's not.

02 — THE AMYGDALA ACTIVATES

Your amygdala (the brain's alarm centre) flags the threat and sends signals to other parts of your brain and body.

03 — THE BODY RESPONDS

Your heart rate increases, muscles tense, focus sharpens, and stress hormones (like adrenaline and cortisol) kick in.

04 — THE MIND REACTS

You feel alert, anxious, or fearful. Your thoughts become more negative, and you may overthink or imagine worst-case scenarios.

Amygdala (highlighted) — MRI scan

"Fear is not just a reaction — it's a chain of events, from brain to body to behaviour."



WHEN FEAR LINGERS



"Fear is helpful in the short term. But when it stays too long, it can take a toll on your mental and physical health."

IT CAN LEAD TO:





01 Anxiety disorders

02 Sleep disturbances

03 Difficulty concentrating



04 Weakened immune system

05 Chronic stress and fatigue



06 Depression (in severe cases)

Fear doesn't always protect you.
Sometimes, it just keeps you from living.
THE GOOD NEWS

Fear can be managed. With awareness, therapy, supportive relationships and healthy habits, it's possible to regain control and feel safe again.

SPONTANEOUS HUMAN COMBUSTION AND THE WICK EFFECT: A FORENSIC FIRE-INVESTIGATION REVIEW

Abstract

"Spontaneous human combustion" generally refers to a body that is extensively burned in the center while the head, limbs, and room surrounding the body have suffered little damage. This research indicates that such a pattern does not necessarily imply that the body starts burning on its own. A small fire originating from an external source can begin burning clothes or beddings. Body fats melt, enter the burned material and act as the fuel source, similar to a candle wick, causing the fire to continue for several hours. Several external causes can cause a spark including cigarette smoking, house fires, suicide, and murder among others. Wick effect provides an explanation as to why the fire persists, but cannot prove the source of the fire, life status of the person, and manner of death. Such information can be obtained through scene investigation, autopsy, toxicology and histological and fire debris analysis. The study is informative, but limited due to rarity of the cases, varied names used in reporting and fire cessation prior to investigation.

Introduction

A phenomenon of “spontaneous human combustion” refers to a burn syndrome characterized by extensive burns to the central part of the body, partial burns to the head and extremities, and minimal burns of the surrounding area. Modern forensics tend to employ other definitions like “wick effect,” “fat wick burn,” or “isolated body combustion.” [1], [2]

The important issues include the origin of the fire, presence or absence of life during the burning, persistence of burning after death, as well as accidental, suicidal, homicidal, or deliberate burning of a body. [3], [4]

The present article discusses the wick effect, gives an overview of experimental and clinical studies, and presents an investigation plan for burned corpses.

1. The forensic phenotype and its terminology

1.1 The usual pattern

The body may turn to ashes, while the head, hands, feet or legs remain intact. The furniture and walls can also survive the event, having an oily-brown covering. [1], [2]

1.2 "Spontaneous" is deceptive

The above pattern is not a proof that the body was ignited on its own. Research shows that there was an initial flame, melted fat, charred clothes, and the long-term burning by means of wick. [1], [3]

1.3 Alternative phraseology

Sometimes authors refer to "isolated body combustion." This phraseology describes what happens in reality but does not say that the fire was not started by anything external. In some cases, the fire extinguished itself, while in others, it was extinguished by the firefighters. [5], [6]

1.4 Limitations of the burn pattern

The burn pattern cannot determine the initial source of flames, the time of death or the manner of death. It is only the basis of investigation, not the conclusive evidence. [2], [7]

2. The wick-effect mechanism

2.1 Fire starting mechanism

An external flame ignites clothing, bed sheets, carpet, or furniture. Charring occurs in the fabric, and melting body fat becomes possible. Body fat can seep into the charring material, thus providing a source of fuel for a fire. [1], [8]

2.2 Why the trunk gets burned more than other body parts

Trunk skin normally contains more body fat than the limbs or head. Trunk skin, if in contact with the material that acts as a wick, can support the flames in the same area. [9], [10]

2.3 Why there is no fire in the room

Wick fires can be small and slow. Thus, the fire can last for several hours and not turn into an extensive room fire. Several factors influence the extent of fire propagation, including air flow, room dimensions, body posture, and surrounding materials. [5], [9]

2.4 How bones are damaged

Prolonged heating can discolor, break, and weaken bones. One experiment revealed a tissue heat value of 17 kJ/g and concluded that it was unlikely for such a fire to propagate to adjacent objects. [11]

3. Experimental evidence for sustained body combustion

3.1 Experiments with animal fat

Experiments with pork tissues showed that combustion required intense preheating and a porous wick. Moderate samples burned with the rate of 1-3 g/s and provided fires of 30-50 kW. A large sample of fat and skin produced 120-130 kW. [10]

3.2 Experiments with whole carcasses

An experiment with a 95 kg pig covered by cotton on carpet was self-propelled even after the exhaustion of initial gasoline and burned for more than 6.5 hours, emitted 60 ± 10 kW and resulted in destruction of more than 60% of the body. [8]

3.3 Experiments with human cadavers

In experiments with two human cadavers, bedding fire lasted 6-7 hours when used as a wick. The torso sustained the biggest damage; the head and limbs – the least. A fire for 15 minutes in a room resulted in surface damage to another torso. [9]

3.4 What these experiments have proven – and have not proven

These experiments have proven physical possibility of body-centered fires. These experiments have not proven the cause of a particular actual fire. Small experiments cannot fully replicate clothing, body posture, moisture, ventilation, and room layout. [11], [12]

4. Case evidence and reconstruction of ignition

4.1 Cigarettes and similar incidents

In four cases in France, investigations of the police identified three fires caused by cigarettes. Alcohol, sedatives, disability, acute illness, and isolation could limit the escape or extinguishing abilities of the victims. [5]

4.2 Proved external cause

In another case, a person sustained severe burning from the knees up to the chest level. The chair suffered substantial burning, but other objects were mostly oiled. The cigarette or cigar was suspected to be the cause of the fire. [13]

4.3 Suicide and post-mortem burning

A case of an elderly woman demonstrated that self-immolation could seem to be spontaneous combustion. The fire was initiated by matches, ethanol, and a firelighter, and most destruction happened after death due to the wick effect. [3]

4.4 Domestic fire or crime scene

Other alternatives need to be considered. Unusual burns can be caused by clothes burning, homicide followed by a fire, or moving of a body. An autopsy cannot differentiate between those variants. [4], [14], [15]

5. Fire-scene and forensic-pathology interpretation

5.1 Analyze the scene first

The investigator should document the location of the body, nearby furniture, clothes, bedding, carpet, soot, air flow, and damage to other items. Patterns of burn can assist in locating the fire's point of origin, but ventilation may alter the pattern. [16]

5.2 Was the person alive at the time of the fire?

The presence of soot in the airways can indicate respiration after the fire ignited. Carboxyhemoglobin can prove smoke inhalation, but no single test can be conclusive. On burned corpses, heat can obliterate or fake significant evidence. [15], [17]

5.3 Toxicology and disability

Alcohol, sedatives, methadone, disease, and disability could account for the inability of a victim to exit. They cannot account for how the body got burned. Toxicological findings should be explained with scene findings and a proposed timeline. [5], [18]

5.4 Integrate all of the evidence

A good investigation should involve scene investigation, autopsy, toxicology, histology, fire debris examination, and the police inquiry. The report should identify the ignition source, fire behavior, vitality, cause of death, and manner of death. [2], [7], [19]

6. Causal interpretation, nomenclature, and limits

6.1 There is a physical explanation

Experimental studies indicate that external heat, body fat, charred porous substance, and time can lead to serious localized burning. This provides an explanation of the features without involving any mysterious internal heat source. [8], [9]

6.2 The wick effect is just part of the answer

The wick effect explains the way the burning goes on. It does not provide information about the ignition point or whether the incident was a suicide, homicide, accident or postmortem. [3], [5]

6.3 Neutral terminology should be used

"Fat-wick burn" characterizes the process suggested. "Isolated body combustion" characterizes the scene. Both are less judgmental than stating that the body spontaneously combusted until the investigation. [1], [5]

6.4 Limitations of the evidence

The evidence is valuable but limited. Experiments are limited in size, and case studies are infrequent and reconstructed after massive destructions. Moreover, there is no universal scale of burn injury description for various fire environments. [1], [12]

METHODOLOGICAL COMPARISON

The evidence base combines controlled combustion experiments, human-cadaver experiments, individual case reports, case series, and reviews. Experiments are strongest for testing physical sufficiency, while case reports are strongest for reconstructing real-world combinations of ignition, substrate, body position, toxicology, and scene context. Reviews are useful for terminology and recurring patterns but cannot replace primary evidence for an individual measurement or event.

Study	Design or method	Sample or setting	Key finding
DeHaan, Campbell, and Nurbakhsh, "Combustion of animal fat and its implications for the consumption of human bodies in fires"	Controlled combustion experiment using animal tissue and fat [10]	Pork tissue and a 26-kg fat-and-skin sample [10]	A porous wick and substantial preheating enabled sustained combustion; moderate samples produced 30–50 kW and the largest sample 120–130 kW [10]
DeHaan and Nurbakhsh, "Sustained combustion of an animal carcass and its implications for the consumption of human bodies in fires"	Full-carcass fire experiment [8]	95-kg pig wrapped in cotton on carpet-covered plywood [8]	An initial gasoline fire transitioned to a wick-supported fire lasting more than 6.5 hours, destroying more than 60% of the carcass [8]
Christensen, "Experiments in the combustibility of the human body"	Human bone and tissue experiments [11]	Healthy and osteoporotic human bone plus a human-tissue sample [11]	Osteoporotic bone fragmented and discolored more; measured tissue heat release was 17 kJ/g and was interpreted as unlikely to spread readily [11]
DeHaan, "Sustained combustion of bodies: some observations"	Human-cadaver fire experiment with comparison fire [9]	Two intact cadavers in bedding fires and one partial cadaver in a furnished-room fire [9]	Wick-supported fires lasted about 6–7 hours and preferentially destroyed the torso; a 15-minute fully involved room fire caused only surface-layer torso damage [9]
Hejna, Bohnert, and Janík, "Unique thermal destruction of the body following suicidal burning"	Forensic case reconstruction [3]	Elderly woman who self-immolated using matches and accelerants [3]	Near-total body combustion followed an external ignition and continued postmortem through molten fat, a wick, time, and suitable microclimate [3]
Duband and Péoc'h, "Commentary on the so-called Spontaneous Human Combustion phenomenon"	Four-case forensic case series [5]	Four women, aged 44–74 years, with 70–98% carbonized body surface [5]	Cases included cigarette ignition, incapacitation, disability, sudden natural death, isolation, and both spontaneous extinction and confinement by intervention [5]

Research Gaps

6.1 A standard description for burns

There should be one standardized way to describe burn extent and location for all cases. Terminologies and descriptions used are inconsistent, making comparisons between the cases difficult. [12]

6.2 Real-world experimental studies

More experimental studies are needed to explore the effects of clothing, body size, fat quantity, moisture, posture, ventilation, and the nature of flooring and furniture materials. The current experiments demonstrate potential results but can not provide the probability for a particular case scenario. [8], [9]

6.3 Improved timing of death

The determination of whether death took place prior to, during, or after the fire event still remains problematic. It is necessary to study soot, carboxyhemoglobin, cyanide, histology, imaging and other biological markers altogether. [15], [20]

The comparison shows convergence between experimental and forensic evidence on the physical mechanism: external heat plus a porous wick can sustain a localized, fat-fed fire for hours and preferentially damage the torso. The case literature adds heterogeneity in ignition and manner of death, so the wick effect should be treated as a mechanism of fire development rather than a standalone diagnosis.

6.4 Better scene documentation

In many cases the investigation begins only after the fire goes out, when evidence of ignition and clothing has been destroyed. More detailed documentation of the position of the body, the spread of the fire, airflow, residues, firefighting measures would facilitate reconstruction. Deliberate burning of the body and its movement must be included in the studies. [4], [19]

Conclusion

Spontaneous human combustion can be explained by the principles of fire. Fire from an external source can burn through the clothes or bed. The melted body fat will sustain the fire just like candle wax sustains a wick. This kind of fire can last for hours, destroy most of the torso, and leave the surrounding materials intact.

The wick effect describes how a fire continues to burn but not the whole process of death. The forensic examiner still needs to establish how the fire started, whether the victim was alive, the cause of death, and whether it was accidental, suicide, murder, or a postmortem case.

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