

Forensic Science:

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Entertainment

Midnight Facts for Insomniacs

Podcast Transcript

(Note: transcript consists of episode outline)

It's a new year, Duncan. New Year same us. I have not grown as a human over the past year. And I'm ok with that. In fact, my resolution is to learn nothing from the mistakes of 2023, to not evolve as a person, but instead to regress to a state of irresponsible bachelorhood, and I'm doing a great job so far. So much squandered potential. Seriously, I haven't been focused on myself recently, I'm a lost cause, so most of my goals for 2024 involve the podcast, and I'm happy to report that we're already well on our way to achieving them, so I'm calling it a win. Miffy has recently been growing at a breakneck pace...and inexplicably. Like from the beginning we've enjoyed steady and predictable growth, I'm proud of the fact that our trajectory has been up and to the right. But it was never a steep incline, it was gradual, until now. over the last couple months...I don't know what happened. We've seen almost suspiciously impressive growth. If you guys are spreading the word, you're killing it, and please keep doing whatever you're doing. And of course, welcome to all of

the new listeners. As Duncan likes to say, you are home here. even if you're bots, we don't discriminate, as the insomniacs know I have always welcomed our robot overlords. But whatever the explanation, I really want to continue this momentum into 2024, I want this to be the year of Miffy. It's actually the year of the dragon, in the Chinese zodiac, the wood dragon specifically, and Duncan you were born in the year of the dragon. I don't know if Wood was involved. But it's your year, Everything is coming up Miffy. Fun fact: In California it is the year of the pocket panther, don't look that up, it hasn't hit the net yet, just trust me. So this is clearly going to be our year, and right now we're looking for suggestions for supercharging our growth. If you know a podcast that is in our same demographic and around the same size and would want to do a promo swap, let us know. if you can think of other ways to get the word out, maybe a contest, we'd love to give away some shirts, this growth has got us really excited and we want to keep it going and even accelerate it, because the landscape of podcasting is only getting more and more competitive, so we can really use your help to strike while the iron is hot. So shoot me a message, hit me up on Instagram or Discord or at midnightfactsforinsomniacs@gmail.com or LinkedIn or smoke signal or carrier pigeon, or a swallow gripping a coconut, feel free to get creative, we can't wait to hear from you guys, because I have to tell you the

insomniacs have been our greatest asset. You all created the discord, you taught us how to market the show and provided designs and logos and ideas for promoting.

So a giant thank you for everything you did in 2023, whether that was telling a friend, telling a bunch of friends, joining the Patreon, sending a kind word on discord, leaving reviews, and of course thank you to our amazing mods and to June and llama. It's a cliché but only because it's true: we wouldn't be here without all of you, and we want to make this year the best possible.

So on to today's episode. This is another huge topic, and as you know I've learned my lesson. We're going to split this one into multiple episodes. At least two, maybe more. Because the topic today is forensic science.

At its most fundamental, forensic science or "Forensics" is the science behind solving crimes. It's a fascinating field of study, simultaneously capable of providing justice to innocent victims and also occasionally victimizing the innocent. What forensic science is NOT is anything resembling CSI. We won't spend this entire episode criticizing and debunking criminal investigations, I promise, but we WILL have to acknowledge some harsh realities: many elements of forensics are notoriously unreliable while some are borderline useless or outright quackery, and should probably be as illegal as some of the crimes they are

attempting to solve. There is no infallible method of determining guilt; even DNA evidence, the gold standard of forensic analysis, has its weaknesses. And detectives are just as flawed as many of their techniques; humans gonna human...Sherlock Holmes, while one of my heroes, is a fictional character, closer to a superhero than a true detective. Shoutout HBO, that's a good show. Or at least season 1.

Let's start with a short history of forensics. It's strange to think that there was a time before forensic science, and even before police investigations. But of course there was a time before ANY science, or police, or laws. Living in the primitive era consisted of 90% tolerating absolute anarchy, 10% murdering anyone who looked suspicious. It was definitely a great time to be sneaky, and have no moral compass. If no one witnessed your crime, you had a pretty solid chance of getting away with it. In order to be punished, a criminal had to be caught red handed—and as you probably guessed, "caught red handed" is a Scottish phrase that referred to what would happen when you forgot to apply sunscreen and then hung your hand out the window of your carriage or chariot on a long journey. No, that's stupid, it referred to catching a murderer with blood on their hands. But just to really drive my previous point home, even that primitive method of forensics is unreliable...if I found a stranger

bleeding on the floor, I'd try to help him or her, thus bloodying my hands and potentially becoming a suspect. Or at least that would be my story. And you can't prove me wrong, because: pre forensics. The main methods of determining guilt in the primitive world consisted of eye witness accounts, oaths, and confessions. Three techniques that rely on human integrity, what could possibly go wrong. Another common method of determining guilt: Trial by ordeal, or trial by combat. Basically the theory was that if you could kill a lion or some giant dude, God must have your back, and God wouldn't have the back of a murderer. The only murderer that God supports is God; killing thousands of people is a grievous sin, unless the murder weapon is a flood; then that's different. So trial by combat was a real thing, and as it turns out, Duncan, I'm not sure if you're aware of this, but innocence often corresponds to athleticism, and general level of badassery. God apparently has the back of a bunch of guys named Grock who are built like Conan the barbarian. Just another version of survival of the fittest.

In medieval times, another infamous method for determining the guilt of a *murderer* specifically was to bring the body of the victim within the vicinity of the accused; if the body of the victim were exposed to the murderer, supposedly the corpse's wounds would begin to bleed. This was referred to as "cruentation." If I were accused of murder, I would prefer this

trial by corpse-vicinity to trial by combat. You either have to kill a lion or not inspire spontaneous hemorrhaging...one of those seems easier. Bodies dry up pretty quickly after death, so presumably a lot of murder suspects benefitted from this method. But not always. A National Geographic article explains: "So, what did people see that convinced them? It's possible that if a body had been dead long enough, the early stages of decomposition may have produced a liquid called purge fluid that can build up in the lungs. Then, when someone poked or jostled a body brought forth for a trial, some of this fluid could have leaked from the nose or other orifices." Ew. Convicted via leakage. Sounds terrible...because it IS terrible, I guess. Btw Purge fluid, that's a better name for masturbation. I'll be right back, I have to go...

Lest you think cruentation was some obscure method of prosecution that was rarely implemented, "Such trials weren't confined to small towns or backwater provinces: No one less than King James I of England was a firm believer in cruentation."

When it comes to the actual science part of forensic science, the Greek mathematician Archimedes is often credited with pioneering the use of forensic techniques via his water-displacement formula: according to legend, he noticed that when he got into his bath, the water rose, and he figured out that an object placed in a body of water—by virtue of water being uncompressible—will displace an

amount of water equal to its volume, so if you divide the mass of the object by the volume of water displaced, you can calculate the *density* of the object.

Archimedes was supposedly so elated by this revelation that he hopped out of his bath and ran naked through the street shouting Eureka! Sure. Maybe the bar for excitement was lower in Ancient Greece; there are very few things that would cause me to run naked through the street, but none of them would have anything to do with math; I feel like he was looking for an excuse. Streaking is a fetish;

Archimedes wanted people to see his little Acropolis. The legend continues— whoever was spinning this ridiculous tall tale just couldn't help himself—so there's a second part to the story: King Hiero II of Syracuse had commissioned a golden crown but wanted to make sure that the maker of the crown hadn't mixed in some silver to save money. Gold has a greater density than silver, so by measuring the volume of water displacement using his extremely exciting new method, Archimedes was able to bust the corrupt crown-maker. Or corrupt maker of crowns...to clarify, not a maker of corrupt crowns. It wasn't the crown's fault.

Weirdly, this crown story doesn't show up anywhere in Archimedes writings, and would have required extremely sensitive instruments capable of measuring the small amount of displaced water, so...I'm calling BS. But it's a fun story. Most stories of early

forensic science are similarly anecdotal and probably didn't happen in anything resembling the established narrative. One of the earliest involves a murder in ancient China. a peasant had been hacked to death with a scythe, so a local lawman gathered together some suspects, and had them lay down their scythes side by side. He soon noticed flies flocking to one, because the insects were still able to detect remnants of blood despite the murderer's best efforts to clean the murder weapon, and he arrested its owner. The moral of this tale: forensic evidence has been sketchy from the very beginning...that scythe could have been exposed to manure, or honey... this is a great example of the problems with relying on whatever the current flavor of forensics might be. Cough BITEMARKS cough.

Almost all forensic science relies on what is known as the *theory of discernible uniqueness*. This is the idea that there are elements of human bodies or gun barrels etc that are completely unique...these objects leave singular marks or residue that can be matched to only one source.

Fingerprints, footprints, gun barrels, handwriting, bite marks...all of these have been or still often are considered to be discernably unique. So a detective using forensic methods would need to find a way to make some record of these impressions and compare them to any potential suspects. When a match is located, boom, case closed. But of course, it's

never that simple.

We'll get into this in more detail when we talk about fingerprints; the bottom line is that any honest forensic investigator would admit that a single piece of forensic evidence doesn't prove anything, but it does help narrow down culprits. If a fingerprint *mostly* matches with a suspect, that's still not proof...but it does help shrink the pool of suspects significantly, and if we can pair that fingerprint with muddy footprints that match the footsize of the suspect, and eyewitness accounts of that person being in the same area as the victim around the same time, and also triangulated cell phone locations...you get the idea. Any single piece of forensic evidence is rarely conclusive on its own, but you only have to persuade a jury that a suspect is guilty *beyond a reasonable doubt*. **"The demise of the theory of discernible uniqueness has made...conclusions more difficult to justify. Most experts now acknowledge that ...the examiner [must] make a decision** about whether the evidence is strong enough to support a definitive conclusion, but there does not appear to be a generally accepted theory regarding how experts should make that decision." Forensics at its best is still a science of probabilities. Like, sure,, this partial fingerprint can't prove anything by itself, but if 90% of a print matches, what's the likelihood that the other 10% doesn't? Forensic investigators who are reputable will often attempt to quantify their degree of certainty

utilizing "*likelihood ratios*." "The likelihood ratio represents the expert's view of the relative probability of the observed features under the alternative hypotheses...A likelihood ratio of 1000, for example, represents the expert's view that the observed patterns are 1000 times more probable under one hypothesis...than under the alternative hypothesis." So basically, I can't definitively say you're guilty, but I can say the odds that you're innocent are pretty much zero. This may sound familiar, because in America we use likelihood ratios in one particularly famous area of forensics, and one with which Maury Povich would be familiar. When he says "you are not the father" he's really saying, based on DNA evidence it is statistically unlikely that you are the father. You can separate the history of Forensics into two distinct periods: BD and AD (Before DNA and After DNA), because forensic science did experience a giant leap forward in the 1980s...and we're...not going to talk about that today. Because again, I've learned my lesson. DNA is a huge subject and we'll get into it next time.

So instead we'll start with the most famous and celebrated element of forensics, popularized by detective novels and crime shows galore

FINGERPRINTS

The scientific name for the skin on your fingers, palms, feet, and toes is "dermal ridge skin." It is particularly

sensitive to sensation and pressure, and lacks sebaceous glands or hair. The whorls and ridges that make up a fingerprint are formed while you're in the womb, starting around 13 weeks and fully formed by 17 weeks. The source of the particular patterns is a hotly debated topic. The prevailing theory for years was that genetics account for about 95% of our fingerprint patterns, and the remaining 5% is the result of environmental factors in the womb. but in 2021, researchers claimed to have solved the mystery: they presented compelling evidence that the design of finger ridges is created by what is known as a Turing pattern, originally proposed by the father of computers, Alan Turing. It's a complicated process, but essentially there are molecules that are programmed to form ridges, and a competing molecule that is tasked with inhibiting that process. The competing action of these two forces results in the unique pattern of our prints. which helps explain why identical twins don't have identical fingerprints. They're very similar, but not the same. Sorry to all the aspiring murderers who have a twin they want to frame. The process by which ridges form is very similar to how a leopard gets its spots, or a zebra gets its unique pattern of stripes. Functionally, finger ridges seem to help us with refining our sense of touch, they move along surfaces and vibrate in different ways based on the terrain they're feeling, sending signals to the brain that allows us to more accurately perceive texture. They also contribute

to our ability to grip; the moisture that makes up a fingerprint functions a little bit like when you lick your finger so that you can leaf through the pages of a book.

According to the most popular classification, which we'll explore in more depth later, there are three types of fingerprints: loop, whorl, or arch. About 60% of fingers have loop type prints, in which the ridges are long loops almost like a series of tiny nested paper clips. 35% of fingers have the whorl, which consists of concentric ovals and is by far the most desirable version of fingerprints. That's according to science. You can have a mixture of fingerprints, your thumb might have the whorl and your index finger might have the loop, but people whose fingerprints are predominantly whorls are generally considered more outgoing, personable, and attractive than their generic and pedestrian loop or arch counterparts. I mostly have the whorl prints, I don't know if I mentioned that. Only 5% of fingers sport those arches, which is good because people with more than two arches are exclusively sociopaths. It's just science. I only have two arches, so I'm good. Don't kill the messenger, arch weirdos. And they would, too. That's their defining characteristic.

So the unique patterns of ridges on each of your fingers are referred to as dermatoglyphs. Here's an official explanation of the scientific structure behind them.

"The dermal papillae (DP) (singular *papilla*, diminutive of Latin *papula*, or 'pimple') are small, nipple-like extensions (or interdigitations) of the dermis into the epidermis. At the surface of the skin in hands and feet, they appear as epidermal, papillary or friction ridges (colloquially known as fingerprints)."

I will forever refer to finger ridges as pimple nipples. Those pimple nipples exude organic compounds, like sweat and oils etc, which often leave a residue on objects that we touch. Fingerprints are actually up to 99% water, but also include among other biological compounds: fatty acids, proteins, glucose, and urea. This just gets worse and worse. I had no idea I was peeing out of my pimple nipples. And there are actually people who are born without fingerprints, it's a condition called Adermatoglyphia. Also known as "wasted potential" if you are not living the life of a super villain.

Anyone who has used a smart phone or laptop with a fingerprint reader knows that fingerprint science is legit; when I got my first iPhone with fingerprint unlock, I spent days trying to see if anyone else could unlock my phone. And...nope. According to Apple the odds are one in 50,000 that someone else could unlock your iPhone with their fingerprint. I tried probably around 20. So I had to ways to go. If you have a lot of friends, this might be a problem. No, those are

good odds, but still risky; last time I checked, there are almost 8 billion humans on earth, and most of them have fingers, and at least one of them might have your exact fingerprint. We like to throw around aphorisms like "no two snowflakes are the same" but there's no way to actually prove that the world has never hosted a pair of identical snowflakes. Same with fingerprints. And the biggest problem with fingerprints has very little to do with the friction ridges themselves and is rather an issue with accurately making an impression of those ridges. In fact, if you were to "lift" a fingerprint from a crime scene, and then lift the same print again, there would be detectable differences between the two prints. This is also true of prints that are taken at a police station using ink, known as exemplar prints. If you collect the same person's exemplar prints twice in a row, mere seconds apart, there will still be differences. Ridges get compressed or squeezed in different ways, the angle at which the person is pressing their finger down changes etc. What we think of as an exact science is very much not.

"When fingerprint comparisons are being made, they are not being made from friction ridge skin to friction ridge skin. They are being made from one imperfect, incomplete recording to another. . . . [Hence] correctly associating a degraded mark to its true source is by no means a certainty, even were one to presume absolute uniqueness of all friction ridge skin."

So I think it's important to emphasize that fingerprint impressions—even ones that have been successfully used to help secure a conviction—are often low quality, incomplete, and didn't always match perfectly with the prints of the suspect. Most prints are latent, meaning invisible to the naked eye, and partial, meaning partial, and they have to be transmitted to a crime lab somehow, often incurring damage or alteration along the way. So part of the job of a forensic expert is to make educated guesses. "Suppose, for example, that a latent print examiner observes that two fingerprints have similar patterns but with slight discrepancies. The examiner must consider how probable it would be to observe those particular patterns (including both similarities and discrepancies) *if* the prints were made by the same finger. This might involve consideration of the likelihood that slipping or torsion of the finger, or some other process, could have distorted one or both of the prints enough to produce the discrepancies." so you can be convicted of a crime even if your fingerprints don't match the impressions taken at the scene of the crime, as long as a researcher decides that they're similar *enough*.

Furthermore, there is no universally accepted method of **dactyloscopy**, which is the actual science of comparing individual fingerprints. Different countries and different organizations have created different methods over the years and haven't

been able to settle on a single standard. Even though they've had plenty of time by now.

Historically, fingerprints were used as far back as 200 BC in Babylon to sign documents on clay tablets. In 650 A.D., a Chinese official explicitly stated that fingerprints could be used as unique identifiers. but fingerprints wouldn't be employed regularly in Europe for identification purposes until the mid-17th century when German anatomist

[Johann Christoph Andreas Mayer](#)

asserted that fingerprints were unique and could be used to identify a particular individual. The three most widely accepted fingerprint patterns that we're familiar with today—loop, whirl, and arch—were first identified in 1823 by Czech anatomist Jean Evangelista Purkyně. It wasn't until about 60 years later, in 1880, that Scotsman Henry Faulds proposed fingerprints be actively collected for the purposes of comparison. Soon police departments were collecting prints, but that created a new problem, because they needed to develop some method for sorting, categorizing and quickly retrieving them from among the thousands of "fingerprint cards" that were being collected. Thus were developed simple classification systems; and there have been multiple competing versions of these classification systems throughout the years: the Roscher system, the Juan Vucetich System, and my favorite, the Henry system. That's the name. Just Henry. That's how popular this system is, it's the Madonna or Lizzo of

fingerprint systems. It doesn't need more than one name. The system was named after Sir Edward Henry who was involved in its creation in the late 19th century, and the Henry system is the foundation of the one we Americans use today. I mentioned that these classification systems were simple, but that's only because I've seen them described that way; I've learned a lot from this podcast, and one thing I have learned is that the word "simple" is subjective. "Henry's classification system assigned a value to each individual finger. Fingers number 1 and 2, being the right thumb and right index, held a value of 16. Fingers number 3 and 4, the right middle and ring, held a value of 8, and so on. Whenever a whorl pattern appeared in a finger, the corresponding value was added to the base value of 1. Henry used a fraction-type primary classification which took the accrued values of the even numbered fingers as the numerator and the accrued value of the odd numbered fingers as the denominator.

Therefore, a person with the fingerprint patterns Loop, Loop, Arch, Whorl, Loop in the right hand and Whorl, Loop, Whorl, Loop, Loop in the left hand would have a primary fingerprint classification of 15 over 1. A person with no whorl patterns would have a primary classification of 1 over 1."

I feel like most of the time, the only thing simple in this entire podcast is me. I'm a simple man, apparently. I mean, I can follow the steps, like the *implementation* of this process is

simple, but beyond that...no thank you. I actually watched a YouTube video that featured a woman demonstrating how to classify a particular person's fingers via the Henry system, and she was getting pretty muddled about halfway through, and that made me feel better. Simple people unite.

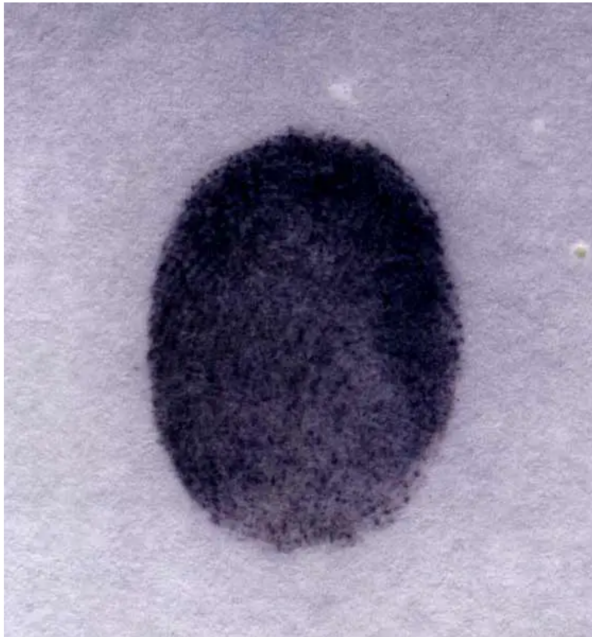
So the classification systems were methods for sorting and retrieving fingerprint cards, but didn't help when it came to comparing an individual exemplar print to a print from a crime scene.

True **dactyloscopy, aka individualization—the ability to compare individual prints**—emerged later. And as I mentioned, there is no **universally accepted method of comparing individual fingerprints. In one method,** "Comparisons are performed by an analyst who views the known and suspect prints side-by-side. The analyst compares minutiae characteristi and locations to determine if they match." For instance, "fingerprint examiners [might] use a small magnifier called a loupe to view minute details (minutiae) of a print. A pointer called a ridge counter is used to count the friction ridges." Sounds very high-tech and infallible. A guy sitting there counting finger ridges what could go wrong.

The first crime ever solved via fingerprint was in Argentina, in 1892. A woman named Francisca Rojas was found guilty of murdering her two sons when a bloody fingerprint at the scene

matched the print from her right thumb. Transferring latent prints to a crime lab became possible in 1901, when Scotland Yard adopted the technique developed by pioneering French scientist Paul Jean Coulier. There was no scotch tape back then, which is the preferred method of 12-year-olds everywhere (did you ever have a fingerprint kit with the duster etc?) so he used iodine fuming, a toxic procedure that—from what I can determine—did not result in what you might call high-quality prints. Here's a photo of an iodine print.

WEEKS TO MONTHS.



*Iodine-fumed fingerprint
after treating with starch
solution*

Use of benzoflavone for p

forensicfield.blog

It's an amorphous blob. I'm sure most of them were better...they had to be, because that is a smudge. It is indecipherable and definitely indistinguishable. Regardless, American Police Departments adopted the iodine fuming method in the early 1900s, and the science expanded—and presumably improved—from there.

Nowadays most fingerprint matching is done by computer, a process in which a succession of fingerprints cycle quickly on a screen until a

match to a known international criminal is detected, at which point the words "match detected" flash urgently and a picture of a mean looking thug pops up... at least that's what I have learned from television shows.

Not exactly.

"Known prints are often collected from persons of interest, victims, others present at the scene or through search of one or more fingerprint databases such as the FBI's Integrated Automated Fingerprint Identification System (IAFIS). IAFIS is the largest fingerprint database in the world and, as of June 2012, held more than 7: million print records from criminals, military personnel, government employees and other civilian employees." And that was over 10 years ago so I'm sure it's significantly bigger by now. They have my prints because I was a substitute teacher. And probably also from all those crimes I've committed.

Moving onto the final forensic technique we're going to look at today...

BLOODSPATTER

This one hurts, because it undermines the foundation of one of my favorite all-time TV shows, if not maybe my *favorite* TV show ever. Did you watch Dexter? It was amazing, and trashy, and amazingly trashy. Michael C Hall played the titular Dexter, a vigilante serial killer, which sounds like a ridiculous contradiction, because it

is, but if you can't suspend disbelief and occasionally turn off your brain you probably shouldn't be watching television. Dexter harnessed his sociopathy and used it like a superpower to hunt and kill bad guys. At least, that was what he did for fun. for his day job he worked in a crime lab as a blood spatter expert. And the show depicts the science of blood spatter analysis as borderline glamorous...in the world of the show, blood spatter evidence is the equivalent of DNA evidence, with equal legitimacy, it is the best possible technique for reconstructing a crime. Dexter could view a crime scene, measure and outline the blood stains and then illustrate the trajectories of blood by pinning red strings to the walls and floor...the crime scene would end up looking like some kind of red-string 3-D sculpture arranged in geometric and even kaleidoscopic patterns. It's very cool and apparently is a real thing that some investigators would do. Of course, Investigators do *many* things. For instance, employ psychics, that's a thing that investigators have done. Investigators are sometimes dumb as shit. Just saying. So by sort of triangulating the pattern of the blood via his string art, Dexter could then reenact and recreate in his mind the entire choreography of a crime. Somehow the blood would reveal every movement of the victim and perpetrator, along with the force and velocity of each stabbing motion, or the trajectory of every gunshot. It's incredibly impressive, and

I use the word incredible here on purpose, indicating the dictionary definition which is "difficult to believe." Aka not credible. It's largely bullshit. Let's find out why.

The grandfather of blood spatter analysis was a guy named Herbert. A name that inexplicably makes me laugh. I don't know why. It's a perfectly fine name. I've known Herberts. And I've tried really hard not to laugh at them. His name was Herbert MacDonell, to be exact. And modern bloodspatter analysis was birthed in his basement in upstate New York in the mid 1900s. Young Herbert set up his first laboratory at age 7, in 1935. He was clearly a well adjusted little kid; when he wasn't playing marbles and stickball he was performing blood spatter experiments in his middle school forensics lab. Actually, at that point Herbert was mostly just playing around with beakers and vials and chemicals, like kids do, but he started honing in on his area of expertise when—while in college studying organic chemistry—he began working at a state crime laboratory in Rhode Island. After Herbert graduated, he went to work for the Corning glass works company, but his heart was in blood, metaphorically and I guess physically, so he began moonlighting as a forensics teacher at a nearby college while also offering his services as a consultant. Herbert's techniques and research were unique, to say the least. He would later admit to shooting dogs in order to study their blood splatter, and covering women's hair with blood, then having them

shake their heads vigorously so that he could study the resulting...abstract art. I wonder if that's how he got them to do it, claiming it was art...this guy must've been charismatic if people were putting up with all of his dog killing and letting him pour blood all over their heads. Herbert also spent years collecting and studying his own fingernails on the theory that their unique striations might be useful for identification. You know how criminals frequently leave their fingernails behind at a crime scene. Maybe he thought they'd be biting their nails out of nervousness, crime is anxious business. Soon Herbert was given the opportunity to participate in his first court case... a murder trial in which he testified for the defendant...who lost decisively and was promptly convicted. But Herbert's hobby had now developed into a passion—a weird, creepy passion—and a potentially lucrative one. Herbert next applied for a department of Justice grant to expand his research. Inspired, apparently, by his history of dog killing and failure to win at any trial, the government approved his funding, eager to make sure this creepy weirdo would have the opportunity to continue failing to convince juries for years to come. Herbert actually has a pretty solid track record of not winning at trial, but that hasn't stopped him from vigorously and enthusiastically testifying in multiple court cases and authoring numerous books on how you too can make money at losing. The first serious publication for which Herbert

was responsible was the result of that Department of Justice Grant: "Flight Characteristics and Stain Patterns of Human Blood." if you're looking for some nice light weekend reading. This was the publication that would establish Herbert as America's premier—and at the time *only*—blood spatter analysis expert. A later book he co-authored about himself would be modestly titled "The Evidence Never Lies: The Casebook of a Modern Sherlock Holmes." He's a humble fellow. Meanwhile, everyone simply ignored the passages in his book and his research papers in which Herbert fully admitted that there was no quantifiable proof of any of the facts he was asserting. Regardless, the Supreme Court of California became the first to accept bloodstain-pattern analysis as admissible in trial, in 1957. Herbert now rebranded his basement to, and this is true, The Laboratory of Forensic Science, and he appointed himself the Director. I am also the director of MY basement, and you can be too. We can be basement co Directors. We don't have a basement. We have a crawl space. I don't know if we can both be Director of the crawlspace, this crawlspace isn't big enough for the both of us. Soon Herbert's expertise was so in demand that he essentially started franchising, he created his own school of blood spatter analysis and began offering the equivalent of blood spatter diplomas. I hope they are actually spattered with blood. For authenticity. Within months Herbert was pumping out "" experts in

the field who had paid him for the privilege of explaining to them the basics of his dubious pseudoscience. Note that Herbert's advertisements for the course explicitly stated that there were "no minimum educational requirements to be accepted into the class," and the entire course took just 40 hours to complete. Deconstructing and reconstructing an entire crime scene based on the distribution of blood would at minimum require knowledge of fluid dynamics and physics, and it wouldn't hurt to understand some basic chemistry. Yet Herbert's students—who weren't even required to have a high school education—were being certified as experts after training for a single work week. by 1983 he had created so many so-called experts that they formed their own professional organization: The International Association of Bloodstain Pattern Analysts. Herbert McDonnell was named the group's only "distinguished member" in acknowledgment of his status as head quack. He was now the foremost expert in an entire pseudoscientific discipline that he himself had created. Now, when it comes to criminal trials, the judge decides which pieces of evidence can be admitted and which witnesses that can be allowed to testify. So if you're presenting yourself an expert, you need a judge to sign off on your credentials and your bona fides. from a pro publica article "In 1980, Iowa's Supreme Court became the first to review MacDonnell's testimony. The judges didn't examine

the accuracy of his technique. Instead, they cited his "status as the leading expert in the field." Finding his testimony reliable, they noted MacDonell's discipline had "national training programs"; "national and state organizations for experts in the field"; "the holding of annual seminars" and "the existence of specialized publications." it would be like allowing a flat earther to testify as an expert on the grounds that there are flat earth organizations. They have pamphlets, for christ sake. What's more convincing than a pamphlet? Of course, not all judges were on board. Iowa Supreme Court Judge Mark McCormick wrote in 1980, "I am unable to agree that reliability of a novel scientific technique can be established solely on the basis of the success of its leading proponent in peddling his wares to consumers." Preach, judge.

However, Herbert McDonnell steadfastly defended his techniques, and continued testifying at trials. To get a sense of just how knowledgeable and infallible this guy wasn't, he testified in the O.J. Simpson trial... For the defense. He claimed that—based on the results of his experimentation back at the forensic basement lab—a glove soaked with blood could not shrink. And as we know, if the glove doesn't fit you have to acquit. We're still going to cover that some day. Blood spatter would become part of American pop culture and the collective consciousness through high profile trials like OJ's; and of course

CSI...and later my beloved Dexter would further cement the idea of blood spatter as solid, established science. But it would be fair to say that the credibility of blood spatter evidence is more contentious than established, and the problem with any science that is open to interpretation is that it is also open to COMPETING interpretations. As blood spatter analysis became more common and experts proliferated, there would be more and more cases of prosecutors and defense lawyers in the same trial hiring blood spatter experts to give completely conflicting accounts of the story the blood was telling. In fact, Herbert McDonnell himself has testified against his own students many times over the years.

Meanwhile, a huge number of defendants have been convicted with little evidence other than blood spatter, and as you can imagine, mistakes were made. In 1997, single mother Julie Rea's son was killed by an intruder, but a pair of blood spatter analysts claimed that this blood told a different story. She would be convicted of her own child's murder in 2000, and spent 6 years in jail before being exonerated when a serial killer confessed to the crime.

Missouri resident Brad Jennings was sentenced to prison in 2009 for the murder of his wife three years earlier, a conclusion based entirely on blood spatter evidence. The case was later overturned... Based on conflicting testimony by a separate blood spatter expert. it would almost be comical if it

wasn't so tragic. Similarly, when 158 microscopic spots of blood were found on the clothing of Sion Jenkins in 1998, blood spatter experts argued over whether the spots were the result of "impact spatter" which would indicate that Sion had murdered his daughter Billy-Jo, or pulmonary spatter, which is blood expelled from the lungs while the child was dying. Zion was initially convicted in 1998, but was functionally acquitted in 2006 after two retrials couldn't return a verdict.

In 2009, the national Academy of sciences released a groundbreaking report on modern forensic techniques that included a devastating takedown of the supposed science behind blood spatter analysis. The report concluded that, "Some experts extrapolate far beyond what can be supported...The uncertainties associated with bloodstain-pattern analysis are enormous." as to the conclusions drawn from blood spatter, the report found them to be "more subjective than scientific."

The report was rigorous, compelling, and largely ignored.

According to an NBC news article, "Judges...are wary of bucking prior rulings, choosing to accept the methods as they always have rather than risk failed prosecutions."

Herbert MacDonell didn't retire until 2012, at the age of 84, and he didn't go voluntarily. In 2012 he was accused of sexual abuse by an 11-year-old girl, and would eventually plead guilty to a

reduced count of aggravated harassment. I do find it kind of interesting that various sources cite this event almost as if it's evidence of his charlatantry, I'm sure there are plenty of genius scientists who are also evil people, and his personal failings really don't have anything to do with his research, but the whole being-an-accused-pedophile thing certainly didn't help his credibility with the law-enforcement community. Today Herbert is 90 years old and a little bit prickly. He dismisses criticism, saying in an interview, "Overall I am very satisfied with my life's accomplishments and have few regrets." However he reportedly gets very upset when people refer to his science as blood "splatter" analysis as opposed to spatter. Next time you bludgeon someone, keep that in mind: their blood has not splatted, it has spatted. Herbert is focused on the important stuff. Not the credibility of his techniques, but semantics. To be fair, I get that. I get very upset about semantics. But I'm also a shitty person.

So there is a lot more to cover, obviously. In the next episode we're going to dive into DNA, and maybe some other stuff, I don't know yet. I'm just getting over being sick so I don't want to think about having to think more than I'm currently thinking, which isn't much. But I'll dive into it soon and I'm sure I'll get excited. And in the meantime...

We have a new maniac...who used to be a menace! Sarah EdenBaum upgraded her membership from menace to maniac. That is bad ass. I love that this is a thing people occasionally do, it makes me feel like they are rewarding us for improving or something. We're worth more than we were when they started. That's validating.

Sarah Edenbaum just edited their membership to \$10.00.



Sarah Edenbaum just edited their membership from \$5.00 to \$10.00.

We also have a new menace! Meet Completely Lost. Which is how I assume most people found our show. They have no idea how they ended up here and essentially surrendered. "I don't know how to unsubscribe to this show so I might as well join their Patreon."

New \$5.00 member! 🎉 Meet Completely Lost



Completely Lost just became a \$5.00 member!



Completely Lost
Completelylostit@outlook.com

And we have a new minion! Jennifer Noel joined on Christmas. I don't think that's a coincidence.

New \$3.00 member! 🎉 Meet Jennifer Noel



Jennifer Noel just became a \$3.00 member!

And finally another new minion . Lindsey Kendall from the UK. We have a large UK fan base, even though we're stupid traitorous Americans who wasted a bunch of their ancestor's tea. It's an honor.

New £3.00 member! 🎉 Meet lindsey kendall



lindsey kendall just became a £3.00 member!



lindsey kendall
Lindseyk88@hotmail.co.uk

Finally, I feel like I should address a comment from Ampari on Spotify, even though I have mentioned this before. Ampari has repeatedly asked for an episode on World War I, and I will make sure that ends up in the next poll, I know you've been waiting patiently

Ampari, but also keep in mind that to officially propose an episode and to vote on them you need to join the discord. So I would encourage you to do that if you haven't because Duncan and I don't pick these topics, we are merely minions ourselves, we are the guys who say how high when insomniacs tell us to jump. So we hope to see you in the discord and best of luck on that topic suggestion.



Ampary • 12 hours ago

Like always, it's a great episode. Can we plz have an excuse for the start of ww1? Have I not asked enough:(?

🗨️ ...

<https://features.propublica.org/blood-spatter-analysis/herbert-macdonell-forensic-evidence-judges-and-courts/>

https://youtu.be/3jFKZaSeNjg?si=Gx1uzLna_xOipRxt

[A History of Forensic Science: Important Inventions & Discoveries \(forensicscolleges.com\)](https://forensicscolleges.com)

[Forensic science - Wikipedia](https://en.wikipedia.org/wiki/Forensic_science)

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[Before DNA: 20th-century forensics \(phys.org\)](https://phys.org/story/2019-08-before-dna-20th-century-forensics)

[How 'Talking' Corpses Were Once](https://www.fox.com/story/2019-08-how-talking-corpses-were-once)

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<https://www.propublica.org/article/bloodstain-pattern-analysis-jury-wrongful-conviction-acquitted-exonerated>

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[The Evolution of Opinions on Forensic Science](#)
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https://www.criminaljustice.ny.gov/ojis/history/fp_sys.htm#:~:text=Henry%20used%20a%20fraction%2Dtype,numbered%20fingers%20as%20the%20denominator.

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