An Introduction to Crime Scene Investigations

Susan A. Bender
Is His Mother A Blood Relative?
A Lesson in Blood Spatter Analysis
Is His Mother A *Blood* Relative?

Police are called to a house where they find a woman dead in the middle of her living room floor. All signs immediately point to a homicide. The police have been called to the scene by the victim's son, who provides them with the following story:

"I came home from school and my mom was cooking dinner. I didn't want to eat what she was fixing, so I decided to walk to the KFC down the street to get some hot wings. But when I got there, I realized I had left my wallet and had to go home to get it. When I got to the front walk, I saw the front door was open, and I rushed in and found my mom on the floor bleeding: her purse was sitting on top of her body. I tried to get her to wake up, and then tried CPR, but I think she was dead when I got here. That is when I called you. Someone must have broken into the house after I left and killed her for her money."

This scenario is based on a true case from the 1980's in Greeley Colorado. There is a correct answer to this case, and a suspect was arrested, charged and convicted.

The police are immediately suspicious of the son's story. Let's see if you can piece the evidence together to come up with a solution to this chicken hearted crime.

Here is the evidence: (Remember good detectives make notes about the details from witness statements and evidence from the crime scene.)

1. There is a tremendous amount of blood at the scene, and signs of a tremendous struggle.

2. External examination of the mother's purse has blood on the handle on the underside.

3. The mother has been stabbed 35 times with a large sharp object. The amount of violence is a sign of extreme anger.

4. There is a cleaver missing from the butcher block on the kitchen counter, it is found in the kitchen sink and it is still wet.
5. The son has blood on his clothes. He has on a button down light blue polo shirt. The shirt is not tucked into his jeans. The following is a list of the locations of the blood spatter on the shirt and clothes:
   - There is blood spatter in small lines across the back of his shirt and across the shoulder.
   - There are small drops inside the collar and underneath the front lower flap of the shirt.
   - There is also blood on the back of his jeans on the lower left leg.
   - There is blood on the edges of the left knee of his jeans.
   - There is also blood inside the calf of the right leg of his pants.

6. The police discover through observation of the son, that he is right handed.

7. The blood spatter pattern in the house indicates that the attack started at the kitchen table, the mother had obviously been seated and ready to eat her dinner. There is food on the table. The table has been set for two. There is an overturned chair beside the table. There is a newspaper on the edge of the table with vertical blood spatter drops on it and it is open to the automotive section with several car ads circled. The police believe that the mother had been interrupted while she was eating and had tried to make it to the front door to escape her attacker. There are blood drops on the floor next to the threshold. There is a bloody drag mark across the floor indicating she had been dragged back into the room. There are bloody footprints leading backward away from the body, and another set leading to the phone. There is no blood on the phone or the table near the phone. There is an arterial spray at about 5 feet from the floor on the wall to the left of the kitchen table. There is also a smeared bloody handprint on the door jam. There is an obvious set of cast off marks on the ceiling above the body.
8. Upon examining the contents of the mother’s purse they find a bloody check stub from the IRS in the amount of $3000 and a bank deposit slip for the same amount. There is about $50 in cash in her wallet, and there is no blood or bloody prints on the wallet.

As the lead detective, you decide to arrest the son based on the evidence that they have found at the scene.

a. Why is the fact that the son is right handed significant to your case?

b. How did blood spatter patterns on his shirt provide evidence?

c. How were these blood spatter patterns generated? Sketches of the scene might help the jury convict your suspect.

d. What other evidence leads you to suspect that the son is not telling the truth?

e. How did you establish that he was a person of interest?

f. What was his likely motive?
Blood in the Secret Garden
Blood in the Secret Garden

It is June and the weather is hot, a young couple is found murdered. Both victims are found outside the female victim's apartment in a small enclosed courtyard. Leading to the garden is a small set of stairs. This is where the female victim is found lying face down. There are multiple stab wounds on the front of the female victim's body and her throat has been slashed obviously from the rear. There is no arterial spray near or around the female victim. There is blood on the front of the female victim, but there is no blood on the bottom of her shoes. The only blood on the back of the female victim is some bloody shoe prints on the back of her blouse that lead down the stairs and away from the scene. There is blood on the ground around the female victim, and there are bloody footprints leading to and from the male victim.

The male victim is found propped against a wall on the opposite side of the courtyard. There are multiple stab wounds to the victim's torso and there are multiple defense wounds. The male victim's throat is so severely slashed that the head is almost severed. There is blood on the wall next to the male victim, from an obvious arterial spray. There is blood on the ground around the male victim and there is blood on the bottom of his shoes.

In addition to the blood evidence found at the scene, a single leather glove was found at the edge of the garden. It was saturated with both the male and female victim's blood and a third type of blood, possibly belonging to the killer.

Can you establish the order of events that took place in this crime scene?

- Who was killed first?
- Who would you suspect (your person of interest) is guilty of this crime considering there were multiple stab wounds present on both of the victims?
- How would you account for the fact that the footprints leading from the male victim cross the female victim's back and lead down the stairs and out of the garden?
- If you find a suspect how could you determine if the blood on the glove belonged to the person of interest?
Dead Drunk or Something Like It
Dead Drunk or Something Like It

A 61 year old male by the name of Ima Boozer was brought into the emergency room was unresponsive and clinically in a severe state of shock. His blood pressure was unobtainable, heart sounds were irregular and distant, respirations were shallow and gasping, and his pupils were fixed and dilated. He was pronounced dead 15-20 minutes after arrival.

Cause of death: Trauma to the chest and abdomen

The Evidence at the Scene:

The man was found lying on his back in a parking lot behind a tavern. The common activities in the area where he was found are drug trafficking, gambling, and prostitution.

Witnesses observed a car suddenly speed out of the parking lot, the vehicle ran a red light, and left the scene at a high rate of speed.

Homicide detectives found traumatic injuries on the victim and considered that the victim had been robbed, and dumped from the speeding car.

What kinds of information will the detectives need to collect to establish the manner of death for this victim?
Autopsy Report

The following traumatic injuries were found on the victim:

- Fractured right ribs 2-11
- Fractured left rib 12
- Right hemothorax (blood pool around the right lung)
- Contusions to and lacerations of the right lung
- Extensive laceration of the liver
- Blood pool in the lower abdominal cavity
- Lacerations of the right kidney

The following signs of natural disease were present:

- Mid arteriosclerosis of the heart (hardening of the arteries)
- Signs of emphysema
- Signs of cirrhosis of the liver

Cause of Death: Trauma to the chest and abdomen
Coroner’s Report

The injury patterns on the victim are as follows:

- Not suggestive of a beating
- Severe blunt crushing trauma with a major force vector directed from the anterior (top) of the torso to the posterior (lower) part of the torso.
- No injuries to the hands or knuckles (no defensive wounds)
- Abrasions on the skin were from pressure not from sliding; there is no indication that the victim was thrown from a vehicle.

Toxicology Report

Blood alcohol levels were as follows:

Ethanol (grain alcohol): .411%

Methanol (wood alcohol): .045%

Isopropyl (rubbing alcohol): .035

Interview Information from the Tavern

The tavern owner stated that the victim had been in his establishment that night. He called the victim one of his nightly drunks.

The victim was an alcoholic who was know to drink any type of alcohol he could find. (Beer, wine, whiskey, rubbing alcohol)

He entered the bar late in the evening inebriated, purchased a few drinks, got several other people to purchase drinks for him and he staggered out at about 12:20 am.
Interview with the Owner of the Speeding Auto

The owner of the car I. B. Boozer II stated that he and a friend had been drinking heavily and left the tavern around 1:00 am.

They walked to their auto from the front of the bar, backed out of a parking space, and left the parking lot.

During the process of leaving his parking space, he felt a bump and thought he had backed into another car.

He left the lot quickly trying to avoid a confrontation with the owner of the car he hit.

His friend confirmed the story.
What is Your Verdict?

The official manner of death was considered to be an accident?

1. Why was the crime not considered to be premeditated murder since the driver of the car had been drinking?

2. Why was the crime not considered to be involuntary manslaughter?

The driver admitted drinking heavily and driving under the influence, but reckless homicide charges could not be filed since:

a. No blood alcohol levels were obtained since the driver was located days after the accident
b. The victim’s extreme intoxication was a greater factor in placing him in a precarious position
Training the Track Star
Training The Track Star

Arielle was a typical 17 year old high school student, she had many friends and was active in sports especially track. Both of her parents had been high school athletes. It was very rare for Arielle to be sick, but lately she had been having headaches and has also been having problems with an upset stomach. Her doctor gave her a complete physical and found that her throat and stomach were slightly inflamed. The doctor asked Arielle and her parents what types of medicines that Arielle had been taking for her headaches. She remembered taking Tylenol and Aspirin but what not sure what medicines she might have borrowed from her friends during track practice. As a safety precaution her doctor advised her to stop taking products that contain aspirin, because many people are known to have sensitivity issues with products containing Aspirin. He also recommended to her mother that she make an appointment with their optometrist to check Arielle’s eyesight, this could very well be the source of her headaches since there were no other obvious medical problems.

Meanwhile Spring was coming and Arielle was anxious to begin training for track season. Her coach had explained to her that a good showing during track season could mean a full college scholarship for Arielle. So she began
a very strict training schedule, and as a result was suffering from her lack of training during the off season. She was really stiff and her arms ached, but she believed this was a really small price to pay for a possible full scholarship.

Several evenings when Arielle came home from practice she was too tired to eat and went straight to bed. Having been a high jumper in high school and college, her father had experience with sore muscles and injuries. So on the way home from work he stopped at the pharmacy and bought Arielle several over the counter muscle creams and pain killers. He was very careful to make sure that none of the capsules contained Aspirin. These creams seemed to help, but Arielle started having increasing problems with an upset stomach. She and her parents believed that her problems were related to all of her increased training and the related stress and excitement about the beginning of track season. Arielle assured her parents that she would be fine and that another doctors’ visit was not necessary.

It was now March and the college scouts were scheduled to visit her school next week. As a result, Arielle began training late into the evening. It was now Friday night and Arielle decided to run one more lap before going home. It was late and the sun was beginning to set. So Arielle did not see
that one of her friends had dropped a t-shirt on the track. Arielle rounded
the last turn and was heading for the finish line, just as she turned and was
moving toward the inside lane she saw something on the track. She jumped
over what she later realized was her friend's t-shirt. As she jumped she
landed poorly and twisted as she landed. She immediately realized that she
was hurt but decided to finish the sprint for the finish line.

As soon as she arrived home, she took a really hot bath to help her
sore muscles. She dried off and opened both tubes of the muscle creams
that her dad had bought for her. She covered her legs with a heavy layer of
both creams and put on a pair of sweats and went to sleep. When her
mother checked on her that evening, she was fast asleep. So her mother
decided not to wake her for dinner. Her parents were concerned but this
was not the first evening in the last few weeks that Arielle had slept
through dinner. The next morning they would wake her up early and feed
her a good breakfast so that she was ready for the scouts that were coming
to see her.

Her father woke up early the next morning. He had decided to take
the day off so that he could go to the school to encourage Arielle during her
try-outs. He quietly went down stairs and began making breakfast. When
the meal was ready he went to the bottom of the stairs and called Arielle for breakfast. When she didn't answer, he waited several minutes and called her again. She still didn't answer, so he decided to go upstairs and check on her. When he entered her room she was lying on her side facing away from him. He called several times and got no response; he tried to rouse her and soon discovered that his 17 year old daughter was DEAD.

Questions to ponder:

1. What do you believe happened to Arielle?

2. What evidence do you have to support your conclusions?

3. Could her parents have prevented her death?
Trouble in Paradise
Trouble in Paradise

This is a true story that took place in the Mississippi Delta in early 2001.

Tim and Chelsea were high school sweethearts. They had grown up in a very rural section of the Mississippi Delta. They married at eighteen and by the time they were twenty-five they had four children. They had three boys Scott, Sam, and Jeremy and a girl Jessica. Tim worked on his family’s cotton farm from dawn until dusk every day of the week, and Chelsea was tired of being the sole parent and of never receiving help from her husband.

The last several years the weather had not been kind to the farmers in the Delta. There had been very little rain and the cotton yield was not high enough for the farmers to make a substantial profit. So the money for Chelsea and Tim was in short supply.

To increase the cotton yields, Tim decided to use pesticides and herbicides to treat his fields. Even though the finances were tight he decided that the use of these chemicals was a good investment. These chemicals are very dangerous to the workers who apply them. If not properly used, the symptoms of exposure to these chemicals include tingling
of the fingers and toes, muscle aches, dizziness, and difficulty concentrating. Tim was always very careful with the application of chemicals, his father had died of Cancer and the doctor believed that his Cancer was directly related to his exposure to all of the pesticides that he had used over the years.

It was now July, and Chelsea needed money to purchase school supplies for her children. The problem was that Tim had spent the money she needed on the chemicals to treat the crops. To say that Chelsea wasn't happy was an understatement. The more stressed that Chelsea became the more unstable was her behavior and her personality. She began to argue with all of the members of her family and especially with Tim.

Chelsea finally decided that she had had enough and decided to file for divorce. Tim was devastated. He still loved his wife and was afraid that he might lose his children. So Chelsea decided to give Tim another chance but she was still obviously very unhappy.

It was nearing Christmas and Tim began to feel really sick. He had begun having periods of confusion and had a hard time remembering his daily schedule. He had also begun having difficulty gripping objects with his right hand. He said he didn’t always feel what he was trying to hold onto/
These problems were always worse first thing in the morning, right after he took his shower, and as the day progressed his concentration and memory began to improve. One good thing was happening, the worse that Tim felt the more attention he began to receive from his wife Chelsea. She even began to help him wash his hair for him during his morning shower. She even bought him a special conditioning shampoo to help to treat the dandruff that he had developed. Chelsea’s mood had begun to brighten and she was happy that because Tim was sick he was being forced to spend more time at home.

Tim enjoyed the extra attention that he was receiving, but after all of the months of her unstable behavior and argumentative attitude he was suspicious. Tim went to see his family physician and the doctor was puzzled by Tim’s symptoms. He had previously been a very healthy young man.
Questions to ponder:

1. Do you believe that Tim has a right to be suspicious?

2. What do you think is happening in Tim’s household?

3. What do you believe might be causing Tim’s health problems?

4. What would you do if you were in Tim’s position?

5. Is there a reason for the Police to be involved in this domestic dispute?
**WHAT IS THE VERDICT?**

So what was the outcome? Tim continued to be suspicious so he collected a sample from all of the household products that Chelsea used to clean the house. He even took a sample from the bottle of the new dandruff shampoo that Chelsea had bought for him. Once he had collected samples from all of the products he brought the samples to Jackson to the University of Mississippi Medical Center. This is the location of the any Forensic Toxicology Lab in the state.

He explained the situation to the physician on duty, and requested that all of the samples that he brought be tested for any suspicious contents. Several days later, the lab called Tim with the results. His dandruff shampoo had been contaminated with the cotton pesticides that he had used in the spring to treat his crops. Tim immediately went to his attorney and filed for divorce from Chelsea and requested full custody of the children.

Tim immediately called the police and had them contact the Toxicology lab in Jackson. Unfortunately, because Tim was the person who collected the samples that were tested and the police had not been involved until late in the investigation charges against Chelsea could not be filed. The
chain of custody of the evidence had not been maintained. At the point
where Tim began to become suspicious, he should have called the police and
allowed one of their forensic investigators to take the samples. This way
they could have established that Chelsea had been responsible for adding
the pesticides to the shampoo. At this point, fingerprints could have been
taken from the containers and other trace evidence could have been
collected. Since there had been a history of domestic problems in the
household the police told Tim that a case could be made by Chelsea's
defense attorney that Tim had poisoned himself to get custody of his
children. Because evidence had been destroyed when Tim collected the
samples police were unable to verify the reliability of the tests that were
performed by the Toxicology Lab.

Ultimately, Tim did get a divorce from Chelsea and did get full
custody of his children, but the judge based his decision on Chelsea’s mental
instability and not on the attempted poisoning. Chelsea was not arrested and
no charges were ever filed against her.
Death at Breakfast
Death at Breakfast

It was a warm Saturday morning in March. It had been an unusually wet spring and Chris wanted to take advantage of the deck outside the community hall in the apartment complex where he lived. So he invited his friends over for a well deserved home cooked breakfast/brunch. The invitations included a planned menu of toast, biscuits, waffles, pancakes, eggs, sausage, bacon, and fruit. He wanted to thank his friends for all of their kindness. His friends had supported him emotionally and financially, during the last few months after he had lost his job. He had a fist fight with his boss, after the boss had insulted his girlfriend. He was still receiving threatening phone calls from someone but he did not believe he was in any danger.

Chris went for a walk to enjoy the morning, stopped by the mailbox and found a package addressed to him. He assumed that one of his friends had sent him an early Birthday present. But he did not recognize the return address. As he walked back toward his apartment, he noticed that the outside of the package was dusty, but he would worry about that later. He was just looking forward to a morning with a house full of guests.

Chris began cooking at 10 a.m. he made the waffles first and then began searching the cabinets for the pancake mix. On the back of the shelf he found a packaged mix that had been opened and in the cabinet for several years but that was all he had so he decided to use it. While he was searching for the ingredients for his feast, he noticed that he had a water leak under his sink. It was a slow leak and he didn't think much of the problem, but knew he needed to report it to the building maintenance man after his party was over. Just another reason for him to move, the air conditioner had not been working properly for several weeks and now this, but he was not going to let this ruin his party. What Chris didn't realize is that this leak had been happening for several months and the bottoms of his wooden cabinets were wet.

Chris's friends began arriving for breakfast at about 11 a.m. and everyone finally sat down to eat at 11:30 a.m. One of Chris's friends noticed that his hands were a little red. Chris said they itched a little but he
assumed it was from all of the dishes that had to be washed after preparing such a large breakfast. Chris started his breakfast with waffles and fruit, and then switched to pancakes. His friends stopped eating the pancakes because they said that they tasted like "rubbing alcohol". Chris continued to eat the pancakes because he was still really hungry.

Within a few minutes after eating, Chris became short of breath. His friends were concerned that maybe he had done too much to get the breakfast ready for them, but as his symptoms continued to worsen they became concerned. The rash on his hands was more severe and he complained on them itching. Several of his friends loaded him in the car and took him to a nearby clinic, where he became unresponsive and died.

The doctor at the clinic was another friend of Chris's and knew of all of the phone calls and other problems that he had been having. So he was suspicious when his otherwise healthy friend was brought to his clinic and died. Since the death was under suspicious circumstances the doctor was required by law to contact the police.

When the police arrived they began questioning all of the quests who remained at Chris's apartment waiting for news about their friend. What kinds of questions will the police ask and what kinds of evidence do they need to collect to prove the cause of death.

Now it is your job to determine what happened to Chris.

Was his death homicide or did he die of natural causes?

What evidence do you have to support your conclusion?
Origins of Death at Breakfast:

In April 2006, the experience of a 14-year-old who had eaten pancakes made from a mix that had gone moldy was described in the popular newspaper column Dear Abby. The account has since been circulated widely on the Internet as scores of concerned homemakers ponder the safety of the pancake mix lurking in their larders.

There is truth in this tale. Yet its inherent warning is overblown.

The cause of his death was determined to be anaphylaxis due to an allergic reaction to molds.

Anaphylaxis is a rapidly developing immunologic reaction that occurs when those who have allergies come in contact with the substances they are allergic to. When it kills, it does so by triggering fatal respiratory or cardiac arrest.

The pancake mix that delivered a toxic payload was analyzed and found to contain four rather nasty molds: Penicillium, Fusarium, Mucor, and Aspergillus. The decedent had not been allergic to eggs (which are a component of pancakes), so there was no doubt as to which allergy had killed him. It had been mold, and nothing but.

There was a death, and it had been due to ancient pancake mix. Or, rather, to an allergic reaction to the mold that had grown in the stale pancake mix.

It needs be kept in mind there is nothing inherently toxic about pancake mix that has passed its freshness date, the product’s getting old does not transform it into a poison, nor does the growth of mold within opened boxes of flapjack powder turn it into something that will fell all who ingest it. Only those who have allergies to mold are at risk, and even then, for the pancake mix to pose a hazard it has to contain mold spores, not just be over the hill.

For mold to gain access to a food product, the foodstuff has to be exposed to its spores. Pancake mix cocooned in an unbleached wax paper, plastic, or a foil pouch within its outer packaging wouldn’t have this contact and should still be safe no matter how old it gets. However, mix sold unpouched in cardboard boxes or paper sacks would likely be at risk even if the box or sack hadn’t previously been opened, because such packaging would not necessarily keep dampness out, and mold thrives in damp environments.

What does all this mean? If you don’t have a mold allergy, you needn’t fear your pancake mix; if you do have such a sensitivity, you shouldn’t keep your flapjack makings around for a few years after opening the box or pouch it came in. It’s not worth dying over 50¢ worth of pancake mix, so when in doubt, throw it out.
DEAR ABBY: I recently made a batch of pancakes for my healthy 14-year-old son, using a mix that was in our pantry. He said that they tasted "funny," but ate them anyway. About 10 minutes later, he began having difficulty breathing and his lips began turning purple. I gave him his allergy pill, had him sit on the sofa and told him to relax. He was wheezing while inhaling and exhaling.

My husband, a volunteer firefighter and EMT, heated up some water, and we had my son lean over the water so the steam could clear his chest and sinuses. Soon, his breathing became more regular and his lips returned to a more normal color.

We checked the date on the box of pancake mix and, to my dismay, found it was very outdated. As a reference librarian at an academic institution, I have the ability to search through many research databases. I did just that, and found an article the next day that mentioned a 19-year-old male DYING after eating pancakes made with outdated mix. Apparently, the mold that forms in old pancake mix can be toxic!

When we told our friends about my son’s close call, we were surprised at the number of people who mentioned that they should check their own pancake mix since they don’t use it often, or they had purchased it some time ago. With so many people shopping at warehouse-type stores and buying large sizes of pancake mix, I hope your readers will take the time to check the expiration date on their boxes. — SUE IN WYANTSKILL, N.Y.

DEAR SUE: Thank you for the warning. I certainly was not aware that pancake mix could turn moldy and cause an allergic reaction in someone with an allergy to mold — but it’s logical. I wonder if the same holds true for cake mix, brownie mix and cookie mix. If so, then a warning should be placed on the box for people like me.

We hear so often about discarding prescription and over-the-counter medications after their expiration dates, but I don’t recall warnings about packaged items in the pantry. Heads up, folks!