Forensic science fundamentals and investigations chapter 10 pdf

 The knowledge of forensic tools and services gives the investigator the ability to detect and seize evidence opportunities that would otherwise not be possible. This chapter examines the various forensic sciences and the application of forensic science as practical tools to assist the police in conducting investigations. The chapter is not considered as a comprehensive thesis of forensic science available. Rather, it is intended to provide an overview to show the wide range of forensic tools available. As mentioned in chapter one, it is not necessary for an investigator to be an expert in any forensic science; The topics of forensic analysis covered in this chapter include: physical matching fingerprint hair matching and fiber analysis ballistic blood spatter analysis DNA pathology forensic analysis forensic anthropology forensic engineering forensic engineering criminal engineering geographical profile forensics profile forensic data analysis forensic documents identification department crime detection laboratory different types of physical evidence can be found at almost any crime scene. The types of evidence and where found can help researchers develop a sense of how to do crime. Tool marks where a forced door was opened can indicate a spot of entry, shoe prints can indicate a travel route, and blood stains can indicate the area where the conflict occurred. Each of these pieces of physical evidence is a valuable exhibition capable of providing public information about the spatial relationships between objects, people, and events. In addition, the use of forensic examinations and analysis can make each of these exhibits a potential means of solving crime. Subject 1: Physical matching if we think for example in Chapter 1 where Sagittarius Street Runners (McCrory, 2013) made a physical match from the torn edges of a piece of Wadi paper to the original sheet from which it was torn, we can appreciate that physical matching is a forensic technique that can be applied, in part, by the researcher personally observing and studying the details of the evidence. At this level, physical matching can be used by researchers to perform in site analysis of evidence. That said, more complex aspects of physical matching do require the expertise of a person trained in To form and express a view is to accept the court as expert evidence. During a mass investigation, physical matching is typically performed on items such as fingerprints, shoe prints, tire prints, glove prints, tool harvesting, broken glass, plastic parts, and torn edges of items, such as paper, tape, or fabric. In these physical adaptations, there are two levels of examination that are normally considered; checking for class features and checking for random features. Level One – Checking the item for class features determines the characteristics of the class takes place in conjunction with items, such as shoe printing, tire printing, glove printing, and harvesting tools. In the first level of review, these items can be categorized and sorted by type, construction, model, size, and pattern. For example, if a shoe print is found at the crime site and is determined to be a left shoe of size 9, nike brand, Air Jordan model, run type shoe with wavy horizontal floor pattern, these class features collectively provide a description of the suspect's shoe based on five defined describers. In turn, these class features may allow investigators to limit their focus to suspects having that class description of shoes. This positive identification of shoes is not specific to any suspect, but allows the potential removal of suspects who wear different sizes, brands, and only running shoe patterns. With this level one examination, an investigator at the crime scene may find a suspected shoe print showing distinctive size and pattern only. If a suspect of matching size and pattern is only found near the crime scene, this surface observation will provide a strong circumcision evidence to help form reasonable grounds to suspect that this person was behind the crime. A level two examination may be able to produce a definitive match. Positive identification requires this next level of review, namely reviews for random features. Level Two – Incidental features feature unique symptoms and features that develop in each case caused by wear and tear. Looking at Nike Air Jordan running shoes, to a positive match of shoes suspected of being picked up at the crime scene, crime scene impressions would be checked for nicks, gouges, and wear patterns typically present on worn shoes. These features are then compared to rolling impressions of suspect shoes, and if the same nicks, gouges, and wear patterns can be shown in all the same places on the suspect's shoes, a positive match can be made. This method is a level two comparison for things, such as shoe printing, tire printing, glove printing, and tool harvesting, action for physical matching. Researchers Often use this physical matching to connect the suspect to the crime scene or the victim. Finding a suspect in possession of shoes, tires, or tools that is a positive match to perceptions at the criminal event is a powerful piece of circumcision evidence. With items such as broken glass and plastic parts, the physical matching process requires significantly greater levels of expertise. On level one, these items are first matched for general features, such as material color and thickness; However, the process for making comparisons of broken edges requires microscopic examination and a photographic veneer comparison of broken edge features to show a positive match. For investigators, these types of comparisons can be recalled where there is broken glass at the crime scene and pieces of glass have been found on a suspect's clothing, or in cases where pieces of glass or plastic remained at the site of a hit-and-run car crash, and a suspected vehicle with damage that contained similarly broken items. Glass fracture analysis can also be used to show which side of a piece of glass received the impact that caused the fracture. It can be a useful tool in verifying or challenging a version of events, such as insurance fraud, breaking in reports, and motor vehicle crashes where damage is exaggerated or staged. Glass fracture analysis can also be used to show the sequence and sequence in which a series of bullets passed through the glass of a window. This can be useful for a researcher to establish the shooter's origin location, and, in cases of drive shooting, direction of travel. Subject 2: Fingerprints have a long history of policing in accordance with forensic science. Fingerprints are accepted as being unique to each individual. Courts often accept positive fingerprint matches conducted by an expert witness as proof of identity beyond a reasonable doubt (Jane, 2010). Before the advent of modern DNA analysis and biometric scanning technologies for positive identification, fingerprints and X-ray dental records were the only truly positive means of making a definitive identification. Fingerprints are unique patterns of lines and mane that exist on areas of our hands and fingertips, known as plantar surfaces. These unique patterns have been classified in categories and features since the late 1800s (Dass, 2016). Different categories and features allow each digit of a person's fingers to be indexed in a searchable system or database. These unique categories and features do not change throughout one's life unless they are damaged by physical injury or intentional wear. Harvesting from our fingerprints is often left touched on our items because the body oils we produce act like Invisible ink clings to the smooth surfaces we touch, thereby transferring these fingerprint impressions to those surfaces. This virtually invisible image transfer is usually called unseen fingerprints, and they are easily made visible on most surfaces through the use of colored fingerprinting powder that sticks to the oils left of our fingers. The oil-sticking powder reveals the lines and manes that make up the fingerprints. It is also possible that a fingerprint impression is exposed on surfaces, such as plastic, dry paper, or paint though a chemical foaming process that reacts with your discolored fingerprint oils, thereby exposing the image. Fingerprints are sometimes also visible when they are transferred to an object because the finger has some foreign material on it, such as ink or blood. Other forms of visible fingerprints can be found as a real moldy impression of fingerprints when a person touches a flexible surface such as clay or cheese. The unique lines and manes of an unknown fingerprint can be searched in a database of criminal fingerprints known for identification. Today, this type of search is conducted electronically using a biometric scanning process known as the Automated Fingerprint Identification System (AFIS). For smaller partial prints, identifying the suspect requires sorting through potential suspects and conducting specific searches of print features to conduct a match. If the person who left the print has no criminal record or is not on the file, the only way to make a comparison is to obtain a set of fingerprint impressions from that person. Once this is done, the print examination will be conducted by a trained fingerprint expert who will search the print to make as many comparison points between the suspect's printing and the print known as possible. The generally accepted standard for accepting a match is finding ten comparison points. The location and identification of the suspect's fingerprints at the crime scene, or on some object related to the crime, is strong circumcision evidence that the court can draw inference that the suspect is somehow connected to the crime. The investigative challenge of finding the suspect's print is to eliminate other possible ways that the print may have remained at the scene, other than through involvement in crime. Subject 3: Hair and fiber analysis once again suggested that a person could not be at the crime scene without leaving behind anything, and could not leave the crime scene without taking anything with him. The proper hair and fiber exhibits support this theory well. As human beings, we kept pouring materials out of our bodies and clothes. Enters a room and we go Strands of hair that fall from our heads, affecting the oilyness of our fingerprints as we touch objects, and fibers from our clothing material. As we leave a room, we get hair from other room occupiers or fibers from carpets and furniture sticking to our clothes. Hair and fiber analysis, although not an accurate science, can provide verifiable evidence. Hair samples can be compared to the hair of a suspect while taking a shaving sample at the crime scene to create a similarity in a limited degree of certainty. If, incidentally, the hair is pulled out and still has root tissue, it is possible to identify more positively using DNA analysis. Somewhat more identifiable than hair samples, fibrous samples can often be narrowed down to compare a higher probability using microscopic examinations for size, color, and type between an unknown sample and a control sample. Issue 4: Ballistic analysis is important for researchers to understand ballistic analysis, given the number of crimes related to guns. Ballistics is the study of all the things that are thrown into flight, how they are launched, and how they fly. In most cases, researchers find themselves dealing with several common types of firearms. There are handguns as either semi-automatic pistols or long gun battalions that operate single-shot screws, automatic, or semi-automatic shotguns that violate loading or operating room pumps techniques in ballistic science that address the unique aspects of firearms and bullets. Because ballistic comparisons seek to determine whether a particular gun was the source of an unknown bullet or cartridge casing, this examination process is sometimes referred to as ballistic fingerprinting. The analogy is that if a particular gun touches a specific bullet or cover cartridge, it will leave behind some uniquely identifiable marks or ballistic fingerprints. Ballistic fingerprints when modern day firearms are loaded into fire, cartridges loaded into rifles are composed of various components. The bullet section of the cartridge is heavily compressed into a brass tube called a coating. At the bottom of this brass coating is a round, flat base slightly larger than the cover, preventing the cover from slipping completely into the gun cartridge chamber during loading. At the bottom of this flat base is the Premera cartridge. When the trigger is pulled, peramine is part of the cartridge that will be struck by the gun firing pin. When struck, Peramine ignites the powder of the gun inside the brass lining with an explosion that causes the bullet to leave the cover, travel down the barrel of the gun and get out of the gun. Each component of the cartridge cover can be forensically examined and comparisons can be made to suspect the gun. In some cases it is possible Determine if a cartridge was fired from the room of a particular gun. This can be done by examining the unique and identifiable symptoms left by the above four components of the gun. Like the physical matching process, it's also a two-level process. On level one, cartridges are classified by calibre, which is the size of the bullet, the cartridge manufacturer, and the initiator location; For ballistic purposes, guns are classified by their caliber, compartment and exdrawn mechanisms, and firing pins, namely either the center of fire or fire reem. The removal of suspected weapons can often be made on level one. For example, a .38 caliber bullet removed from the crime scene could not have been fired from a .22 caliber weapon. Or the same .38 caliber bullet showing signs of the outsider mechanism would not have been fired from a .38 caliber revolver that does not have an outsider mechanism. On level two, more decisive ballistic fingerprint comparisons are often made using the following methods: matching Striations; room markings; pin firing comparisons; and outstriwing markings. strept consistency . Shots fired from either a handgun or a long gun, apart from a shotgun, fire a projectile at a time. This projectile fired is a lead or lead-composite bullet. When fired, the bullet travels down the barrel of the gun and begins to rotate as the inside of the gun barrel is deliberately swidded with long grooves, called rifling. These grooves take the soft lead sides of the bullet, which rotates it like football, and this spinning makes the bullet travel more directly and correctly to the target. As a result of these grooves designed to barrel the gun, each shot with markings fetched into the bullet material will reach its target from contact with barrel grooves. These etched markings are contact striations, and they are uniquely identifiable to the gun they were firing from. For an investigator, these brawls create an opportunity to match the bullet with the gun that fired it. Recovered bullets can be recovered and compared to test rounds fired from a suspected rifle. When striations of a recovered bullet are compared to known samples fired from a suspicious gun, a side-by-side microscopic technique is used to match the thyme markings. An expert ballistics examiner can sometimes identify and show matches in quarrels to play a positive match. Cartridge room marking. When a cartridge is loaded into the room of a gun, the glossy brass lining comes into contact with the hard steel sides of the room. This cartridge compartment can leave unique and identifiable scratch marks next to the cover. Cartridge covers are withdrawn or evacuated from a weapon and left at the crime scene can sometimes be matched to Gun by comparing this mark. Shoot the comparison pin. When the firing pin of any weapon attacks the peramine at the bottom of the cartridge, it has a torturn mark. This firing pin can sometimes be matched by the firing pin of a suspect's weapon. It requires microscopic reviews that appear for the unique characteristics of firing pins that become soft metal peramine affected when firing calls happen. Marking the exiting mechanism. Weapons loading and unloading methods have evolved considerably due to various gun designs. The simplest guns allow the user to open a gun violation that exposes the cartridge room to manually insert the cartridge and close the breach to prepare for firing. There is no exdrawn mechanism for these guns, so there will be no removed marks left at the base of a cartridge when discharged from the weapon. Other guns have a variety of outsider methods, including those that take the base of the cartridge cover to physically pull it from the breach and get away from the gun. In cases where a gun has an outsider mechanism, these mechanisms leave very distinct and unique marks on the base of a soft brass cartridge. These markings can sometimes be compared and matched again with the removeder of a suspected weapon. With this wide variety of ballistic comparison techniques, one researcher has a significant number of tools that can be deployed and strategies that can be involved to help match a bullet to the gun that it fired. According to these tools, covering the cartridge left at the shooting site can be as important as a bullet removed from a shooting victim's body. An investigator should consider this as evidence when recording cartridge coverage. Great care requires exercise to document the location where each individual coverage was found, and to maintain any coverage in a manner that may not degrade possible markings that could enable a match to be made. Damage can be done by inserting the cover into a common bag where they can rub against each other causing more features and fading existing symptoms. In addition to ballistic fingerprinting examinations, route analysis is another area of ballistic science known as path analysis. The path of a bullet is the path that comes from when it leaves the barrel of the gun to the point where it eventually loses the energy of the gun's propulsion and comes to rest. Flying a bullet can be very short, as in the case of an empty-point shooting, where a victim is shot at very close range, or it can be very far away where the target is a mile away or more, as in the case of some sniper shootings. When the bullet travels longer distances, it travels on an arc or travel path as it is drawn by gravity towards the earth. The bullet reaches its destination, it will have a distinct angle of entry into the target. This entry angle can sometimes be calculated as the path to estimate the geographical location of the originating shot. In cases where a bullet passes through several objects, such as two walls of a house, the bullet's path can be used to determine where the shooter is located. In cases of drive-by shooting, for example, where several shots are fired, the traj line pattern can indicate whether the shooter was moving and, if so, the direction of the journey. Issue 5: Blood spatter analysis blood spatter analysis, also known as blood spot pattern analysis, is a relatively new forensic specialty. The purpose of this analysis is to determine the mass events in which blood flowed. This is done through a detailed examination of how blood is distributed inside the crime scene. Studies have shown that certain patterns of distribution can be expected when blood is released during an attack (National Center for Forensic Science Technology, 2012). For example, a person who is struck with a baseball bat will start bleeding, and blood will be distributed in the spatter drop pattern in the direction of the victim's back strike. These drops of blood will have a directional journey that will be shown with the directional slide of each drop while the bat hit objects on its way. Blood from the victim sticking to the bat can also be distributed when the bat is hitting for the next strike. This blood will be distributed in an upward directional slide pattern, for example, up to a wall, on the roof, or behind the attacker. Calculations about how many strikes were carried out may be revealed from tracking multiple drop streams behind the victim and behind the attacker. Due to this developing science, blood spatter analysis can be useful in rebuilding the criminal event. Issue 6: DNA DNA analysis, or deoxyribonucleic acid, is a molecule that has a genetic plan used in the development, function, and reproduction of all organisms. In this way, it carries unique genetic information and morvit characteristics of the cells from which the living organism is formed. Except for identical twins, the DNA profile of each living organism is unique and distinct from other organisms of the same species. There are some rare cases where one person may carry two distinct types of DNA, known as Chimra (Rogers, 2016), where peddring twin embryos merge during pregnancy, or in cases where bone marrow transplants allow the production of brain donor DNA in the recipient's blood. In these rare cases, a person may test for two distinct DNA profiles for different parts of their body. In humans, DNA comparisons can match the high probability between discarded body material and From which those substances originated, body materials containing cellular substances, such as blood, semen, seminal fluid, saliva, skin, and even hair root tissue can often be compared and matched to their original owner with a high statistical probability of comparison (Lindsey, 2003). Sometimes even very old body materials such as dried blood, dried saliva, or seminal spots can be analyzed for a DNA profile. The introduction of DNA analysis has allowed detectives of advocates to re-examine historical evidence and acquit individuals wrongly convicted and imprisoned for criminal offences (Macrae, 2015). DNA is a very powerful tool for researchers and can be considered discarded at any time physical material is found at the crime scene. Even very small amounts of material can yield enough material to compare DNA. What matters is that DNA data banks of known criminals and unsolved crimes are now becoming well established in North America (Royal Canadian Mounted Police, 2006). When a person is convicted of certain criminal offences, DNA is collected and provided to these databases. Chapter 7: Forensic pathology is the process of determining the cause of death by examining the dead body during autopsy. Autopsies are generally performed in the pathology department of a hospital. In the case of a suspicious death or a confirmed murder, police detectives will be present in an autopsy to gather information, take photographs and seize exhibitions of a non-medical nature such as clothing, bullet fragments and items that may identify the body. These will include personal documents, fingerprints, and DNA samples. During the autopsy, a forensic pathologist carefully examines, documents and analyzes the organs to determine the cause of death. In the first stage of autopsy, the pathologist examines the body for external injuries and trauma indicators that may provide the cause of death. In this first stage of the study, the pathologist will give an estimate of the time of death by observing evidence of four common indicators after death. These are body temperature, strict mortis degrees, post-mortem lividithy, and decomposition progression. Algor Mortis' body temperature is the scientific name given to the loss of post-mortem body temperature, which can sometimes be used to estimate the time of death (Guhraj, 2003). This is a viable technique in cases where the body is being examined within 24 hours of death. This method of estimating the time of death can vary significantly depending on many possible variables, such as: ambient room temperature being in the normal range of about 22 degrees Celsius of body temperature before the victim's death that does not rise by illness or applying clothing thickness that may convince the body temperature to escape And the conducting of the body's surface was on it, which can artificially increase or decrease the temperature due to the normal body temperature of 37 degrees Celsius at the time of death, it can be estimated that the body will cool at a speed of 1 degree to 1.5 degrees Celsius per hour. This calculation is known as the Glaister equation (De Saram, Webster, & Kathirgamatamby, 1956). Therefore, capturing the inner rectal and subtracted temperatures, which of 37 degrees Celsius will provide an estimate of the number of hours that have passed since death. For example, a dead body with a temperature measured at 34 degrees Celsius provided a time range of 3 to 4.5 hours from the time of death. Regal Mortis is a term used to describe the tightening of the body's muscles after death. The dead body will contract from a loose muscle condition or limp to one where all the contracting and stiff muscles cause the whole body to become a constant position. After being in a contracted and steady position, the muscles eventually relax again (Advameg, Inc., 2017). At normal room temperature, this tightening of the muscles and relaxing again has a predictable time progression of approximately 36 hours. In this progression, muscle tightening will take approximately 12 hours, the body will remain stiff for 12 hours and will gradually loosen again over the next 12 hours. Muscle tightening begins with small muscles in the hands and face during the first 2 to 6 hours, and then progresses over the next 6 to 12 hours to larger muscle groups of the trunk, arms and legs. These are general rules; however, the rate of strict mortis can vary for babies, people with severe muscle development, or where extensive muscle activity is before death, such as a violent struggle (Cox, 2015). Cox (2015) advised in determining the time of death at moderate environmental temperatures: If the body feels warm and loose, it is less than 3 hours that if the body feels warm and stiff, it is 3 to 8 hours that if the body feels cold and stiff, it is 8 to 36 hours that it is dead if the body feels cold and loose. , it has been dead more than 36 hours Post-Mortem Lividity Post-mortem lividity refers to a discoloration or staining of the skin of a dead body as the blood cells settle to the lowest part of the body due to gravity. This discolority occurs across the entire lower side of a body; However, in places where parts of the body are associated with another solid foam or body, meat compression and staining will not occur in that area. Red coloring is purple, and it begins to become visible within 1 hour of death, and become more bold within 4 hours. Within the first 4 hours, livy spots are not fixed, and if the body moves, Products change and stain the part of the body that has become lower. In most cases these spots are fixed between 12 and 24 hours. In this way, they can be viewed as an indicator of how the body remains at the time of death. It is important to conclude that the body has been moved or relocated after the 12-24-hour stain setting period (Cox, 2015). Decomposition is the ultimate indicator that a pathologist can look at to estimate the time of death. Sometimes, dead bodies are not discovered in time to use body temperature, strict mortis, or early livity indicators to estimate the exact time of death. In these cases, evaluation of the progress of decomposition is important. Decomposition starts as soon as the body survives. Due to the environmental conditions of extreme heat or cold, reading signs of decomposition will be revealed 36 to 48 hours after death (EnkiVillage, 2017). These symptoms include body bloating and discoloration of the skin marble in a spider web pattern along the superficial blood vessels. As the body continues to decay, the surface of the skin will open and bodily fluids begin to see. In advanced stages of decomposition, the body is often no longer identifiable with facial recognition, and DNA testing or dental records are transformed into identification tools. In the very advanced stages of decomposition, flies and maguts begin to emerge, and the number of magut-to-fly life cycles can be estimated by a forensic entomologist to provide the amount of time that has passed since the beginning of these insect life cycles. Once these initial examinations have been carried out, the pathologist will cut the body open to undergo a detailed internal examination of each organ to look for signs of trauma, illness, or external indicators that may explain the cause of death, such as water in the lungs or toxins in the blood. The causes of death are a wide range of possible causes of death, and pathologists are trained to follow these B-like indicators, gather evidence and develop expert opinion on the cause of death. Causes of death can include: cutting or stabbing shooting blunt force choking toxic substances of electrification of the necessities of life in cases of discontinuation or stabbing, wounds are inserted by a sharp weapon or pointed object. The pathologist will attempt to determine whether the death was caused by damaging a vital organ or losing blood. The distinction here is that a person may be slashed or stabbed in such a way that they cause bleeding, which will only be shown to the pathologist with only a small amount of blood left in the body. Alternatively, a wound or stab wound may penetrate the heart, lungs or brain in a manner that stops organ function and causes death. In Cases will determine the pathologist and provide an opinion of the fatal organ injury. In cases of stabbing, the pathologist can sometimes show the wound's entry point and track the path of the wound so that the angle of entry indicates how the stab wound was inserted. The size, depth, and width of the wound may indicate the size and type of weapon used to cause damage. Likewise, examining wound characteristics can provide information to allow the pathologist to provide expert opinion on the direction of cuts or cut wounds by showing the starting point and termination point. This information can be useful for investigators in rebuilding or verifying actual actions and weapons used in a criminal event. In shooting cases, the pathologist will determine whether death from the fatal destruction of an organ was vital or the loss of blood. Recovering bullets or fragments of a bullet from inside the body can be useful in ballistic analysis. Checking the incoming wound can sometimes indicate the distance from which the wound was inserted. In cases of gunfire calling the point blank or straight, there will be remnants of gun fire (burnt gun powder) at the wound entry point. As with a stab wound, the path that the bullet came from the entry point to the body to where it came to rest can sometimes be identified by a pathologist to determine the angle of arrival. For investigators, this information can be useful in rebuilding the criminal event and determining the location of the shooter. In cases of gunshot wounds, an empty point of entry point and a bullet track indicating the position of the logical weapon in the victim's hand can provide some confirmation or contradiction of theory of self-inflicted wound. In cases of blunt force trauma, the pathologist will be looking for signs of organ destruction or massive internal bleeding causing death. Blunt force trauma can be in many ways, such as a massive sudden blow caused by a crash from a large altitude, or a high-speed car crash that can immediately damage the brain, heart, or lungs to the point where they stop functioning and lead to death. Other blunt force blows such as strikes to the head with weapons may immediately cause death, but also lead to widespread bleeding and internal blood accumulation, which can cause death. In cases of pathologists, head injuries will sometimes be able to determine the point of contact where the injuries have been done and will be able to point out the effect of the contedor coupe injury, which occurs when the head is struck on one side and the brain moves so traumaticly inside the skull that it also damages the opposite side and bleeding occurs on the top of the brain. This bleeding inside the skull can sometimes cause death. in a similar effect, Child Syndrome (SBS), (Elsevier, 2016) occurs when a baby baby is violently shaken by a person and the baby's brain moves backwards and forwards in the skull, causing bruising and sometimes fatal bleeding in the front and back of the brain. Examination by a pathologist for contact points and internal bleeding can provide valuable clues as to how blunt force is hit. Studies show that SBS is the leading cause of death in children under two years of age, and UK and US research studies show that SBS may occur every year in as many as 24 to 30 per 100,0 children under two (Smith, 2010). In choking cases, a pathologist will look for indicators of how the body is deprived of oxygen. Several common means include suffocation, suffocation, smoke inhalation, or drowning. For the octopus, the pathologist will look for bruises around the neck inflicted by suffocating hands or by ligaments. Liator is any case such as a rope or belt that can be used to restrict breathing and stop oxygenated blood from going to the brain, thus causing death. If a libator is used and removed, it will take a distinctive wear line. If a dead body with ligaments is found in place, researchers should take great care to unbed the liciator, but cut it off from the victim, as this allows the size of the liciator to measure and compared to the size of the neck to determine the amount of breathing that was restricted. When the ligament is removed from the dead body, a distinctive liator mark or groove in the flesh will sometimes be visible. To determine the octopus, the pathologist will examine the victim's eye for a small torn blood vessel that appears as red spots on the white of the eye. These spots are known as petechial bloodshed, and will often be visible in victims of rape (Joufeh, 1994). Asphyxiation occurs as a cause of suffocation when the victim's breathing is stopped by an object such as a pillow or plastic bag, which limits the victim's ability to breathe, thus causing death. Unlike octopus, choking has fewer indicators of violent trauma. Choking deaths are sometimes accidental, and it is harder for the pathologist to definitively determine the pathologist. The presence of a choking device at the site of death is sometimes the first clue to this cause. Other donor causes can be a victim's limited ability to remove a device that accidentally prevents them from breathing, as it may be found with a very young child, a disabled person, or a poor elderly victim. Another unique type of choking death is the Automatic Erotic Afizixia (AEA). This happens when a person is trying to increase their sexual arousal or pleasure while And it uses the octopus itself with a liator. Their goal in the AEA is not to commit suicide, but to achieve a state of severe oxygen deprivation and euphoria at the time of orgasm. This strategy can go wrong when the person passes and does not release their liator causing continued and death. These cases can be similar to suicide; however, they are really dying by the wrong adventure because the victim had no intention of killing himself. The AEA can sometimes be distinguished from suicide despite apparent masturbation, pornography on the scene, and liator devices that have liberating controls. In cases where choking is caused by smoke inhalation, a pathologist can find signs of soot blacking out in the lungs, and if the air containing smoke was warm enough, the lungs would also show signs of burn trauma. Because fires are sometimes used as a means of disguising a homicide, finding a dead body in a burning building, and not finding signs of smoke in the lungs, it is a red flag for possible death by murder. In cases where suffocation is caused by drowning, a pathologist will find signs of water present in the lungs. If there is any question about where the drowning was, a diatom test can be performed on the victim's tissue. If the victim had drowned in fresh water, the diatom substance, which is microscopic algae, has migrated from water in the lungs to the victim's blood and tissue. These microscopic algae are species unique to certain bodies of water. Diatom materials found in a victim's lungs must match the diatom sample of the water in which the body was found. If it doesn't match, this suggests that the victim drowned elsewhere. In cases of toxic substances, a pathologist will test the contents of the stomach, blood, eye fluid known as vibrating humor, and tissue samples from various organs of the body for toxins, drug overdoses, swallowing toxic chemicals, or inhaling toxic gas. Each of these substances can cause death if they are bled or inhaled in sufficient amounts. In cases of electrocution, the person dies due to an electrical current that passes through his body and stops the heart. A pathologist will look for signs to confirm that a stream has passed through the body, including contact burns in which a person has touched the source of power that entered his body and existed to the ground point. This terrestrial point is often through feet on the ground, but can be shorter through a contact path, if the hand or other part of the body was in contact with a terrestrial object. Burns will also be visible where the electrical current is removed from the body. Cases where the necessities of life have been denied generally occur where there is an interdependent relationship between a caregiver and a victim. Victims in these cases are typically very young or very elderly people who To take care of their own needs. These often take place over a long period of time and may include other forms of physical neglect or abuse. Failure to provide the necessities of life is a significant issue in which criminal law in Canada makes it a crime. The duty of individuals to provide the necessities of 215 (1) each under a legal duty () as a parent, foster parent, guardian or head of a family, to provide the necessities of life for a child under the age of sixteen; And (c) to provide the necessities of life to a person under his charge if that person (I) is unable, because of his arrest, age, illness, mental disorder or other cause, he or she will be able to present himself with the necessities of life. Marginal note: The offence (2) commits any crime which, under a legal duty in the meaning of subdivision (1), fails without legal pretext, proof of which lies in him, to perform that duty, if () in light of the duty imposed by paragraph (1)(a) or (b), (i) the person who owes him the duty in the circumstances of the hapless or necessary, or (ii) non-duty, the life of the individual That the duty owes him, endangers, or causes or is likely to put that person's health permanently at risk; (Canadian Justice Laws, 2017) Marginal Note: The punishment (3) of any who commits a crime under Sub-Section 2 (a) is guilty of indictment and responsible for imprisonment for no more than five years; (Canadian Justice Laws, 2017) If a person's death is found to be caused by failure to provide life's necessities, the responsible caregiver can ultimately be charged with criminal negligence causing death. Issue 8: Chemical analysis there is a wide range of chemicals and uses that can be used in crime commissions or found at crime premises. In addition to general chemical analysis, there are several sub-domains for analysis in cases: accelerators used in fire crime; explosive analysis in cases of conventional crimes and terrorism; toxic chemicals and biological agents used in cases of murder, industrial negligence, and terrorism; drug analysis in cases of drug trafficking and overdose; analysis of bullet residues; and chemical analysis and matching of transmission Paint in cases of impact and run motor vehicle crashes. Issue 9: Forensic Archaeology New in the forensic world, forensic archaeology uses archaeological methods by experts to exhume scenes of crimes, including bodies. These forensic experts are trained to methodally dig and record their drilling. They document the recovery of artifacts, such as human remains, weapons, and other buried items that may be related to the criminal event. Forensic archaeologists will often work in concert with other forensic experts in DNA, physical matching, forensic oncology, and forensic odentology in examining evidence. Topic 10: Forensic Entomology forensic entomology is a very narrow field of forensic science that focuses on the life cycle of bugs. When a dead body is left in the elements and allowed to decompose, the investigative challenge is not only to identify the body, but also to stabilize the time of death. Once a body is decomposed, the process of determining the time of death can be helped by a forensic anatomist. As discussed in the previous chapter, these experts look at the drawbacks that live on the decomposing body through different stages of their life cycle. From these life cycle calculations, scientists are sometimes able to provide and estimate the relative time of death. Issue 11: Odontology Forensics in the words of the description provided by Dr. Leung (2008), forensic dentistry is essentially forensic and includes expert analysis of different aspects of teeth for review purposes. Since the advent of dental X-rays, dental records have been used as a reliable source of comparison data to verify the identities of bodies that were otherwise too damaged or over-decomposed to identify through other means. The development of DNA and the ability to use DNA in identifying badly decomposed human remains have made identity less critical through dental records. That said, even in a badly decomposed or damaged corpse, teeth can retain DNA material inside the tooth, allowing it to remain a viable source of post-death DNA evidence (Gaytmenn, 2003). Beyond identifying dead bodies, forensic odontology can sometimes also provide investigators with assistance in verifying the possible identity of a suspect responsible for the sting mark. This compares with examination and preservation of bite mark photography on a victim or an object, and the subsequent matching of details in that configuration of the sting mark to a dental mold that shows the sting configuration of a known suspect's teeth. Although the sting mark comparison has been in action for more than fifty years there have been questions to reliability for accurately matching an unknown bite sign to a suspect (Giannelli, 2007). Issue 12: Forensic Engineering is a type of investigative engineering that examines materials, structures, and mechanical devices to answer a wide range of questions. Often In cases of car accidents, forensic engineers can often estimate the speed of a vehicle by checking the extent of damage to a vehicle. They can also match the damage between cars and the road surface to determine the impact point and speed at the time of impact. Many police agencies have already trained specialized traffic personnel in analyzing accidents and rebuilding accidents. These officers use a variety of forensic engineering techniques to investigate and document the dynamics of car crashes to stabilize how and why an accident occurred. In cases of building collapse, forensic engineers can conduct analyses to determine the cause of a structural failure, and in the case of an explosion of intent, such as acts of terrorism, it would point to the location of the planted explosive device. Research facilities for forensic engineering are too extensive to elaborate here, but if damage to a building, an object, or a piece of equipment raises a research question, forensic engineering tools should be used to search for answers. Subject 13: The criminal profile of the criminal profile, also referred to as the Psychological Profile, is the study of criminal conduct for the development of the most likely social and psychological profile of a person who may have committed a crime based on the actions of known criminals who have committed the same type of crime in the past (Royal Canadian Mounted Police, 2015). The criminal profile draws information from many sources, including historical criminal statistics of known criminals. In addition, other information has been gathered about their violent and meddous criminals. This type of information can clarify details such as preferences for Loring's victims, taking trophies, kidnapping methods, preferring captivity, torture methods, means of killing and displaying a dead body after death. With specific information and data collected from a broad classification of criminals, psychological profiles work with investigators to examine the details of the criminal investigation, and based on known historical criminal conduct data, they determine descriptions and possible characteristics that might be expected in the current suspect's profile. For researchers, this type of profile can be helpful in focusing research on people most likely. As these profiling techniques are expanded, a database known as the Violent Crime Link Analysis System (ViCLAS) has been in place in Canada since the 1990s. The system documents the criminal conduct of convicted violent criminals and sexual offenders, as well as some unsolved cases, with the aim of documenting a variety of crime and criminal behavior to a searchable database where unsolved crimes can be linked to violators with matching profiles. According to the ViCLAS system web page, since the implementation of ViCLAS nationwide, the database to swell with cases. As of April 2007, there were about 300,000 cases on the system, and more than 3,200 links have been made so far (Royal Canadian Mounted Police, 2015). The criminal profile provides valuable tools to sort and prioritize identified suspects for further investigation. In some cases, a new suspect may even be identified through data in the ViCLAS database. Issue 14: Geographical geographic profile is a geographical profile similar to the psychological profile in which it seeks to focus on the possible behavior of an unknown offender based on data collected from past criminal behavior known from others. Unlike psychological profiles, geographic profiles are focused specifically on where a suspect may be living towards the location where their crimes are currently being committed. In the late 1980s, Police Detective Inspector Kim Russmo developed a mathematical formula that began evolution in the new forensic science geographic profile. Dr. Russmo credited his mathematical formula for observing that criminals generally seemed to live near identifiable locations where they committed their crimes (Rusmo, 1987). Applying this method, when an offender is suspected of committing a series of crimes, can have the locations of those crimes investigated by a geographic profiler to estimate where the suspect is most likely to reside. This assessment could be helpful in searching and identifying new suspects by prioritizing suspects based on their residence than the identified area with the highest probability of finding the suspect. Issue 15: Forensic data analysis in today's digital world, criminal behavior often involves evidence in the form of digital data. Collecting data from mobile phones as proof of a criminal conspiracy, or tracking the message of images transmitted in the distribution of child pornography, all require significant levels of specialized technological knowledge to collect, maintain, and analyze the exhibition. Some crimes, such as identity theft and subsequent fraudulent misuse of funds, are almost entirely digital data crimes and go through several areas of technology expertise. It now affects ordinary researchers to understand the basics of how to preserve digital evidence, and know when and if digital evidence may exist. A regular investigator without the skills and qualifications of forensic data should never attempt to retrieve digital data evidence without assistance. The destruction of evidence will be like an uns mentor investigator trying to lift fingerprints at the crime scene. Subject 16: Forensic document analysis of forensic document analysis is typically carried out by forensic document examiner certified work as independent contractors or as employees inside Government-funded crime detection laboratories services. Often within the scope of duty fraud investigations, these specialists review items, such as Will, Land Title, Contract, Practice, Seal, Stamp, Bank Cheque, ID Card, Handwritten Documents and Documents from Photocopying Devices, Fax Machines, and Printers. These documents are often examined to certify them as genuine or unchanged original documents in which allegations of misreserved or fraud have been made. Original signatures are also sometimes questioned, and these examiners can determine authenticity by comparing the signature sample with the actual known ones. Forensic experts are also asked to analyze threatening letters, ransom letters, or holding notes to communicate with a identified suspect. Issue 17: Forensic identification departments forensic identification departments of frontline forensic specialists typically work within their police agency. Usually these specialists are experienced police officers who have taken forensic training in photography, fingerprint examination, physical matching, evidence collection, and crime scene management to work in this type of department. The daily work of forensic identification departments includes attending crime scenes, conducting a variety of examinations using special fingerprint dust, chemical foaming agents, and ULTRAVIOLET light sources to discover perceptions of fingerprints, shoe marks, tool marks or even body fluid stains that are not visible to the unarmed eye. When stains or forensic impression images are found, these specialists can record, maintain, and retrieve exhibits using photography and specialized tools to lift the exhibit from a level or eliminate the entire surface printed as an exhibition. Issue 18: Mass Detection Laboratory Mass Detection Laboratory, such as RCMP Laboratories throughout Canada, offers a range of expertise, including; Biology - comparing the fluids and hair of the suspect and the victim's body; It can also mark handwriting comparing ballistic firearms - matching shells, casings, and firing bullets into weapons and determining bullet-track marking tools - matching tool harvests to the suspected source of tools scientists employ to work in this crime detection laboratory requires four years of specialized degrees in the field of their choice. When they were hired, they did. A low study period of 12 to 18 months will become susceptible to a laboratory with the expectation that they will be sufficiently susceptible in their chosen field to achieve undergraduate jurisdiction from the court. This undergraduate status will allow them, on a case-by-case basis, to present expert opinion evidence about their review of forensic exhibitions. For a researcher willing to engage crime detection laboratory services, it is necessary to complete a request for exhibition analysis they wish to review and present that exhibition, whether in person or with electronically recorded doubles, directly to the Crime Detection Laboratory to ensure the continuity of the exhibition. After reviewing, the exhibition analyst returned again either by calling for personal lifting or with two registered along with a certificate of analysis detailing the outcome of the examination. The certificate of analysis can become an exhibition to expose the defense in a criminal case, and in the absence of competition, will be accepted by the court as evidence. In case of objection, the scientist of the Crime Detection Laboratory will be called in to appear in court and provide examination testimony and results as expert witnesses. They generally cross examined by defense to validate their undergraduate qualifications and analysis. This chapter summary enumerated a wide range of forensic tools and services available to criminal investigators. For each investigator, the knowledge of forensic tools and services provides the ability to detect and seize opportunities for evidence that would otherwise not be possible. The image of physical evidence found at any crime scene only has face value as a collection of objects that must be viewed and considered in its existing association with the event. Analysis of those similar objects using forensic tools can add significant information, build a circumcision connection between players and the event, and add new insights. Forensic analysis can make the difference between solving a crime and becoming a cold case. In terms of physical matching, what is the difference between a level one and a level two examination? How are hidden fingerprints visible? What's the difference between level one and level two ballistic examination? What's the blood spatter analysis? Four common post-death indicators in autopsies are considered? How else can a pathologist be useful to the police in addition to being able to speak out for the cause of death? What is forensic archaeology? What is forensic oncology? What is criminal case-making? What's ViCLASS? Wei-class?