

IT'S ALL IN THE DETAIL

Evidence collected and analysed at the scene of a crime can make or break a case. Here's how forensic teams go about their work

By PETRO-ANNE VLOK & CHRISTIAAN BOONZAIER

PARALYMPIC athlete Oscar Pistorius shot and killed his girlfriend, Reeva Steenkamp – that's not in dispute. But there are two versions of how it happened: his defence team says he ran on his stumps into the bathroom and fired through the toilet door; the state claims he put on his prosthetic legs before he pulled the trigger.

Only one person knows the truth: Oscar. There are no witnesses, and in cases such as this the law relies on painstakingly collected and meticulously analysed forensic evidence to determine exactly what happened.

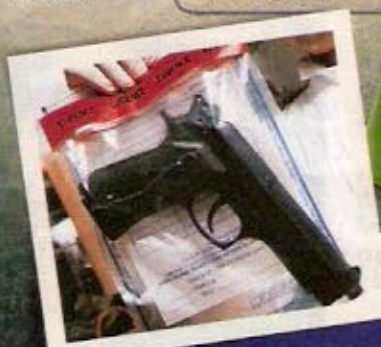
"It's like putting a puzzle together," ballistics expert Cobus Steyl says. "Various forensic experts use their knowledge to create a picture."

When someone commits a crime, evidence is always left behind, leading forensic expert Dr David Klatzow says. "If you touch a window you leave fingerprints; if you walk on a carpet your shoes pick up traces of fibre. If you hit someone they'll bruise."

We look more closely at how experts work a crime scene.

1 FIRST MEMBER

- When called out to a possible murder, the first police officer on the scene, called the first member, assesses if the victim is still alive. If so, the chief priority is to preserve life.
- If the victim is dead, the officer secures the crime scene using SAPS-identifying tape. Officers are stationed to prevent unauthorised access.

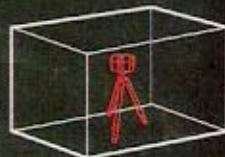


EVIDENCE BAG

Objects collected from the crime scene are placed in sealed evidence bags or containers. This prevents evidence being contaminated or tampered with.

3 PHOTOGRAPHER

- Before anyone may touch anything a photographer has to document the scene. Sometimes video documentation is also used or crime scene technicians make sketches.
- 3D total station scanners are relatively new and effective documenting tools which take 3D images of the scene.



2 CRIME SCENE MANAGER

- The forensic department's crime scene manager (CSM) relieves the first member. The CSM takes control of and responsibility for the scene and assigns crime scene technicians and an investigating officer (IO).
- Next is the planning phase. The CSM, crime scene technicians and IO take a "first walk" through the crime scene, noting possible routes used by the victim or perpetrator as well as spotting what can be collected as evidence. They must take care not to disturb any evidence.
- The CSM decides which experts and forensic resources are needed and the order in which the scene should be investigated.



BALLISTIC EVIDENCE
Sent to nearest ballistics unit.



FINGERPRINTS
Sent to local criminal record centre.



NOT LIKE THE MOVIES
 The SAPS don't draw chalk outlines around bodies because chalk can contaminate potentially incriminating evidence.



4 CRIME SCENE TECHNICIANS

- They go through the scene with a fine-tooth comb. Because of the high crime rate in SA, crime scene technicians are often unavailable, in which case the IO collects evidence.
- Technicians often use fluorescent light when searching for DNA samples. Blood, urine, semen and vomit show up in a bluish colour, even if the perpetrator tried to wash it off. UV light can help technicians see evidence hidden from the naked eye such as fingerprints, fibres and bruises on bodies.
- Technicians are expected to keep meticulous records and note the date, time and place where evidence was collected. Memory is fallible and wouldn't hold up under cross-examination in court. Technicians have to label evidence as soon as they bag it.
- After evidence has been collected on and around the victim, the body is taken to the morgue for further investigation by a forensic pathologist. Bags are placed over the hands and feet to preserve potential DNA evidence under the nails.
- All collected evidence is preserved in evidence-collection kits and sent to the forensic science laboratory for analysis.

BLOOD SPATTER EVIDENCE
 Sent to nearest biology unit. See next page for more on the science of blood spatter.

MARKING THE SCENE
 Coloured cones are placed throughout the crime scene to mark where evidence was collected. Each crime scene is different but technicians can, for example, place yellow cones next to blood evidence. The cones are also used to map the crime scene.

THE BODY
 The state pathologist examines the body.

CHEMICAL EVIDENCE
 Sent to nearest chemistry unit.

ELECTRONIC EVIDENCE
 Sent to nearest scientific analysis unit.

FOOTPRINT AND DNA EVIDENCE
 Sent to the police's biology unit and the local criminal record centre.

TO AVOID CONTAMINATING A CRIME SCENE EVERYONE SHOULD WEAR

- 1 Head covering
- 2 Surgical mask
- 3 Forensic suit
- 4 Gloves
- 5 Foot covers

WHAT IS COLLECTED AS EVIDENCE?

TRACE EVIDENCE
 gunshot residue
 paint residue
 broken glass
 unknown chemicals

WEAPONS AND FIREARMS
 knives
 guns
 bullet holes
 cartridge casings

BODILY FLUIDS
 blood
 semen
 saliva
 vomit

DOCUMENTS AND DEVICES
 diaries
 suicide notes
 computers
 cellphones
 memory sticks

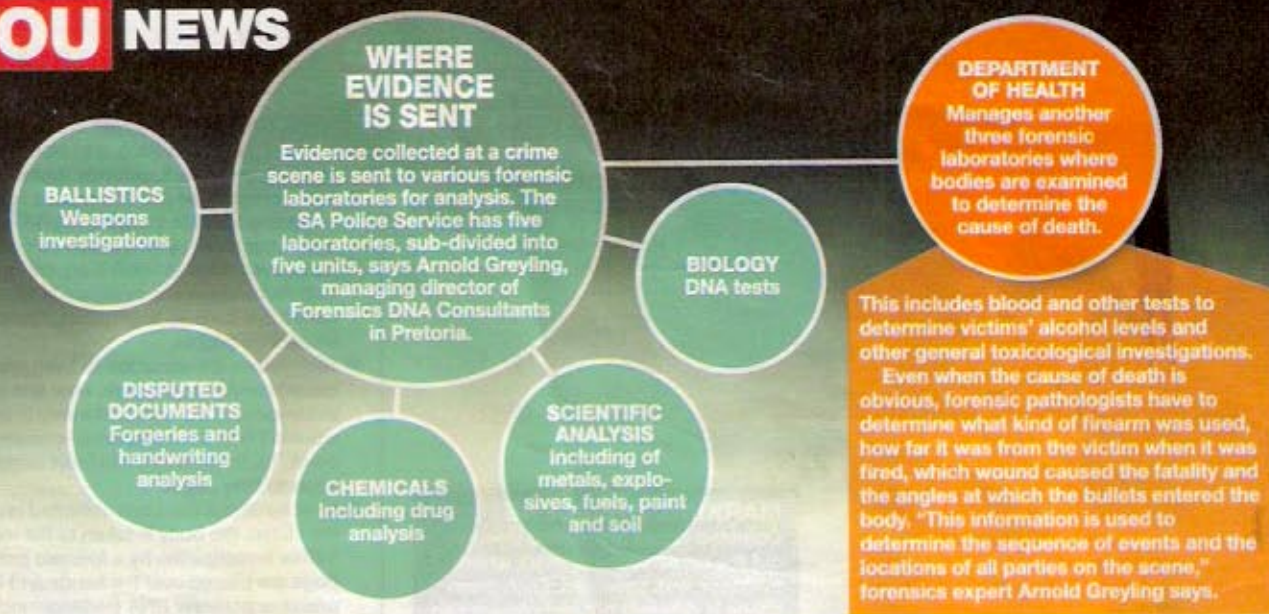
IMPRESSIONS
 fingerprints
 footprints
 tool marks

HAIR AND FIBRES

EVIDENCE SCALE
 Before evidence is removed and sealed in evidence bags, it has to be photographed to scale. This allows the size of the object to be determined when the pictures are presented in court.



(Turn over)

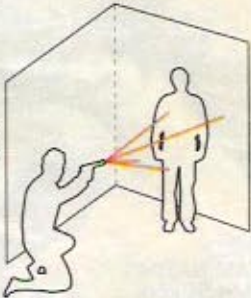


SPECIALISTS

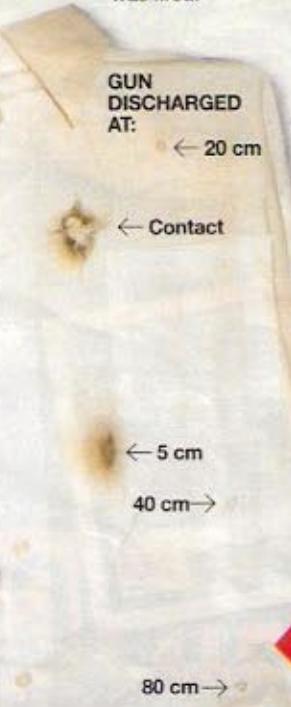
BALLISTICS EXPERTS

These specialists determine what firearm was used, where the shooter was when he pulled the trigger and the angles at which the shots were fired.

- Pistols discharge cartridges at different angles and distances, depending on their make. "For example, a Beretta discharges about two metres to the right," Cobus Steyl of Forensic Ballistic Services says. "If you find an undisturbed cartridge on the scene, you can determine where the shooter stood."
- If there are bullet holes or blood spatter, experts use a probe, string or a laser pointer to determine where and at which angle a shot was fired.



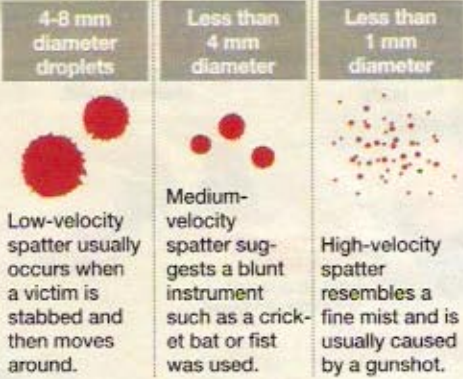
- The barrel of a gun contains grooves, which leave fine, unique markings on the bullet. If a firearm is found on the crime scene, ballistics experts fire two live rounds into a water tank. Using a special comparison microscope, they compare the grooves on the bullets to those from the investigation. A match means they've found the murder weapon.



The victim's clothes can also tell you how close the shooter was.

BLOOD SPATTER ANALYSTS

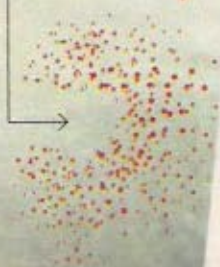
Blood spatter can tell you a lot about a crime and the type of weapon used.



BLOOD DROP ELONGATION
If a drop of blood falls perfectly vertically it will be round but if it falls at an angle it will leave a tail:



VOIDS
Analysts look for voids in the spatter. This indicates something or someone caught the spatter – such as the assailant getting blood on his clothes.



FORENSIC ENTOMOLOGISTS

"If a fresh body is dumped outside, it won't take long for flies to find it and lay their eggs," says Dr Sonja Brink of the department of zoology and entomology at the University of the Free State. Taking the temperature outside into account, the developmental stage of blowflies can tell you when a body was left outside, she adds.

- Day 1** Blowflies are quick to descend on corpses and lay their eggs.
- Day 2** Eggs hatch and larvae emerge.
- Days 3 to 7** Larvae grow.
- Days 8 to 9** They form a hard cocoon-like shell and develop adult features.
- Two weeks** The adult fly emerges. "The timeline is based on a constant temperature of 21 °C for a specific species of blowfly."

BACKLOG OF TESTS

Between 1 April and 30 September 2012 the police's forensic scientists received 209 431 samples for analysis. According to the minister of police, Nathi Mthethwa, most of these tests had been completed by November 2012. "The turnaround time for DNA tests in rape cases is usually about 30 days," says Arnold Greyling, managing director of Forensics DNA Consultants in Pretoria. The backlog at the department of health's laboratories is far greater. "Toxicological tests are far more complicated and there's a backlog of several years," Greyling says. "There's a high staff turnover and the department frequently loses experts. It takes years to train replacements and it's expensive." He adds the backlog can't be blamed just on the laboratories. "The way investigations are carried out as well as the justice system add to the delays."