

POLICE LINE DO NOT CROSS



Elemental, My Dear Watson.....

An overview of the complimentary disciplines of gunshot residue analysis and forensic firearms examination

They are rare species in the UK; experts who are specialised in the recovery, identification and interpretation of gunshot residue (GSR) and those who can interpret shooting related crimes scenes. The majority began their careers at the Forensic Science Service (FSS) and underwent rigorous training before being able to report the full range of gun crime casework. The number of competent experts active in both disciplines in the UK can now be counted on two hands, the majority being employed by the police or commercial forensic providers who work predominately for the prosecution. There are very few who have a proven track record in providing their services to the defence. In the last couple of years The Forensic Firearms Consultancy (FFC) Ltd. has tried to redress the balance.

When a gun is fired the hammer strikes the percussion cap at the base of a cartridge. The primer detonates and sends a stream of hot gases into the main charge of propellant, which ignites, generating large volumes of gaseous products, which force the projectile down the barrel of the gun. The high temperature inside the cartridge creates conditions in which the individual components of the primer can fuse together. These particles are emitted from the end of the barrel of a gun and from any gaps or openings in the gun's action and can be deposited on the firer, any persons sufficiently close to the firer, and the gun itself. After the material has cooled discrete particles remain containing combinations of the elements of the original primer and contributions from the gun barrel, cartridge case and the bullet. The recovery and identification of GSR on clothing or hand samples can

help address questions such as, “has the suspect fired a gun?” GSR is not a conclusive evidence type such as DNA or fingerprints. It is a corroborative evidence type but the usefulness of GSR should not be underestimated as its presence or absence in crimes involving firearms can be crucial to the overall strength of evidence when a case comes to trial.

It is rarely contested that GSR originates from a firearm. What is of far more interest is how the particles came to be present on a suspect's clothing, skin or hair. This can only be evaluated within the full circumstances of the case taking into account both the prosecution and defence hypotheses. The type of firearm and ammunition used in the crime is also important information to the GSR expert as it can have an impact on the amount of GSR that may be deposited onto the suspect or their surroundings. GSR is one of the most heavily scrutinised trace evidence types in criminal investigations and the expert must ensure that police officers, solicitors, barristers and ultimately the court understand the strength of the evidence. With any trace evidence the possibility of cross-contamination should always be uppermost in the mind.

One of the many recent cases that FFC Ltd. have been involved in was that of the Glasgow gangland murder of Kevin Carroll in 2010. A single particle of GSR was identified on a jacket recovered from the home address of the suspect more than six months after the shooting. The address had been searched by armed police officers that were likely to be contaminated with GSR. The prosecution expert stated that a lack of information about the source of the particle precluded saying anything more about how the particle was deposited however after hearing both the prosecution and defence evidence during a *voir dire* the judge ruled the particle inadmissible as evidence citing the possibility that it arrived on the jacket through secondary transfer from the firearm's officers clothing.

Numerous studies for the presence of GSR on armed police officers, their vehicles and equipment, police officers not associated with firearms and occupational environments have found that sources of contamination do exist. Reporting an unqualified finding of the presence of gunshot residue can ultimately mislead the court.

With the fragmentation of the provision of forensic science in England and Wales and the creation of a commercial



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FFC offers bespoke, customer-led solutions to all firearms and GSR-related investigations.

Forensic Firearms Consultancy (FFC) Ltd is an innovative company led by two world-renowned experts.

During their time at the UK Forensic Science Service (FSS), Mark Mastaglio and Angela Shaw became the most senior scientists working in forensic firearms and gunshot residue (GSR) respectively. It is the only UK-based private consultancy offering this level of expertise, experience and worldwide reputation in firearms and GSR. FFC can undertake work at every level of forensic firearms and GSR examinations and has extensive experience of complex, sensitive cases from across the globe.

The FFC directors are two of the most senior and experienced practitioners in the UK, with over 35 years of firearms and GSR court reporting experience.

FFC's Expert Witness service includes:

- ❖ Examination of the full range of cases, from the alleged illegal possession of firearms and ammunition to complex interpretation of fatal shooting incidents
- ❖ In-depth knowledge of firearms legislation involving complex classification issues – an insider's knowledge of firearms law policy
- ❖ Civil or criminal case investigation
- ❖ Court attendance
- ❖ Potential for accidental discharge
- ❖ Trajectory reconstruction analysis, including scene visits
- ❖ Determination of the type of gun used
- ❖ Determination of how many guns used
- ❖ Range of fire determination
- ❖ Interpretation of autopsy findings, including autopsy examination attendance
- ❖ Interpretation of GSR findings (incorporating SEM-EDX results)
- ❖ Critical analysis of GSR contamination issues

If you need immediate advice, please contact either **Mark Mastaglio** on +44 7919 217 848 or **Angela Shaw** on +44 7919 392 397. Otherwise please email us at: enquiries@forensicfirearmsconsultancy.com. Our website is at: www.forensicfirearmsconsultancy.com



market place for the procurement of forensic services it is becoming all too common that information regarding the firearm and ammunition and the results of any scene interpretation is not shared amongst the prosecution experts. It may be that the GSR work is carried out by a commercial Forensic Science Provider, the crime scene analysed by the investigating police force and the work to determine how many guns were fired is undertaken by the National Ballistics Intelligence Service (NABIS). Prior to the closure of the FSS best practise dictated that firearms and GSR experts would normally have carried out the examination of the clothing of gunshot victims jointly, to ensure a joined-up approach to establishing the circumstances of a shooting. Now, it appears to be that the clothing is examined independently by the respective experts, decreasing the opportunities for the two complementary disciplines to share knowledge and discuss the findings in real time.

The complementary expertise of the firearms forensic scientist also assists in the interpretation of firearms related scenes of crime where guns have been discharged. The firearms expert can determine not only how many guns were used but the type, whether or not ammunition components such as bullets and cartridge cases had been fired or even loaded into a given gun, together with the

accuracy and propensity of the gun to discharge inadvertently. The GSR and firearms experts work in tandem in establishing a range of fire – a crucial consideration when considering homicide or suicide or suggestions of a gun being fired during a struggle. The accuracy of a gun and the position of the bullet impact site may have a bearing as to whether or not the shooter had any intention of inflicting injury or death. Reconstructing bullet trajectories is very much within the remit of the firearms expert; such work can be vital in determining the position and possible intention of the shooter, as the trial of Oscar Pistorius amply demonstrated. Harnessing the latest in laser scanning technology can enable crime scenes to be reconstructed showing the potential trajectories. The resultant computer aided animations of scenes can be invaluable in explaining to a court what was possible and equally importantly what was not possible.

They may be a rare species, the competent GSR and forensic firearms expert, but at the Forensic Firearms Consultancy Ltd. there is no chance that they will become an endangered one! ■

Angela Shaw and Mark Mastaglio
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