

Crime scene investigation – the golden hour

I was recently contacted by a media company who are researching material for a documentary programme. Specifically, they were focusing on (what is sometimes referred to as) the ‘golden hour’, researching the need for speedy processing of crime scenes. Specifically, they asked if there is a ‘golden hour’ after the crime took place in which the data and evidence should be collected. It was this question which got me thinking.

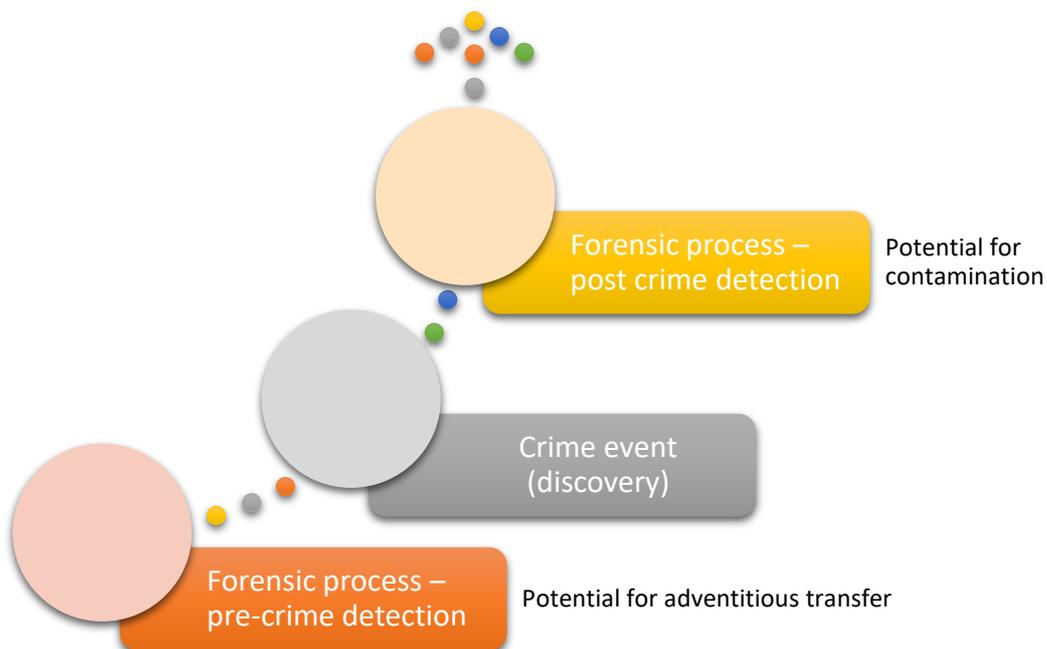
Although I hadn't necessarily considered the ‘golden hour’ the concept did prompt me to both reflect and research a few ideas which I thought might be of interest to some readers. Without necessarily suggesting ‘blue light’ attendance – there is perhaps a case to be made for the speedy response and processing of these scenes. This is particularly so in respect of the emergency, care and ‘damage’ control due to the security and management of the crime scene. I still recall one of my latter (whodunit) murder scenes which, according to the log, had been entered by eighteen police officers prior to the scene being secured and processing beginning! I recall others where items had been moved by the first officers attending which subsequently caused confusion, embarrassment and litigation against the force concerned. Accepting of course this was some time ago now – nevertheless I wouldn't necessarily be surprised if this ‘practice’ may still exist from time to time despite the years of guidance by the NPIA, College of Policing *et cetera*. And so, I got to reflect a little on this and thought it might be of interest to share some of this.

The forensic process

Many of us will appreciate that the ‘forensic process’ commences at the crime scene and continues until the evidential results are presented in court. In reality of course it begins sometimes before we have necessarily understood that a crime has actually taken place. In this sense, it may actually begin with the initial ‘call for service’ and focusing upon what witnesses saw and said. Sometimes it appears more obvious than not that crime has occurred although, of course we to guard against preconceptions and drawing premature conclusions. It is, perhaps this ‘pre-crime’ (awareness) phase can very often lend itself to the problems of ‘adventitious transfer’ of material in the very early stages of the forensic process. More simply put, where potential evidence is destroyed by accident or carelessness in the very early stages of the enquiry. It seems that this is most likely to occur if the crime is not

carefully managed or speedily attended and controlled by those who have specific training and skills in this topic.

Thinking a little more deeply, it might be useful to reflect upon the investigative process and consider the effects of speed. After all, investigators have told us repeatedly that speedy processing is paramount. As a consequence, we are aware that some DNA profiles can now be processed in the order of around 80 minutes using the Rapid Hit DNA technology. Clearly the need for speedy scientific processing has been identified by various stakeholders in the criminal justice process. Furthermore, we have seen the effects of rapid fingerprint turnaround during a number of projects, most notably those operations whereby fingerprints are transmitted from the crime scene and processed quickly. Repeatedly we've seen the effects of this speedy processing in the arrest of individuals who, from time to time, had the stolen property within their possession. We know however that the potential for contamination runs all the way through and will include police, crime scene investigators, pathologists and forensic scientists. In this sense, there is seems to be a need to balance both speed and efficiency/effectiveness.



Adapted with grateful thanks to the Principal Forensic Scientist Group

Many of us appreciate that the 'forensic process' can be thought of as a continuum or timeline between the (pre) crime event; the transfer of material; subsequent analysis and reporting of results. It might appear logical to appreciate that the potential for contamination would exist between either end of this continuum. More

and more we are made aware of interpretational issues associated with the detection thresholds of DNA; isolation thresholds; multiple donors and contamination. It might be fair to assert that (a) some of this contamination/adventitious transfer would begin prior to the isolation of DNA. Likewise (b) we know that some extraneous substances cause DNA to degrade and likewise the need to (c) isolate and clean DNA as expeditiously as possible. And so, it Without We should also draw attention to differentiating between contamination and adventitious transfer. Generally speaking, (and with all evidence types) we know that the possibility of a forensic recovery diminishes over time. This doesn't mean to say that things would necessarily be lost immediately as it would depend upon the evidence type and the environment. Depending on the crime and the evidence type – some material can be lost due to inclement weather. For example, a footwear mark left in the open (say on the clothing of a deceased person) would be susceptible to bad weather. For example, rain would limit the ability to collect this type of material.

Naturally, there is sometimes little we can do to prevent the potential for adventitious transfer either before the crime or when the crime is discovered. Nevertheless, what is clear is that the potential for adventitious transfer would seem to increase with the passing of time. Likewise, we know that the extent to which contamination affects the results will depend upon the amount (and presumably) opportunity for contamination.

Sensitivity

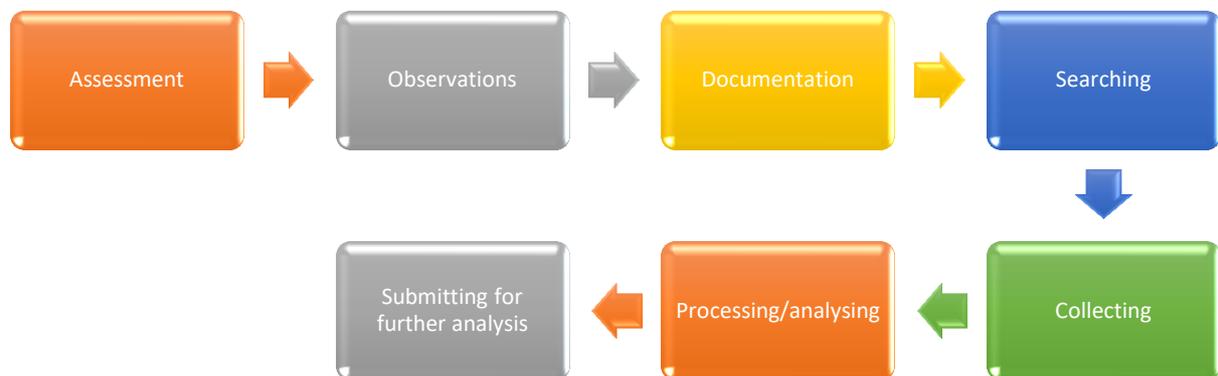
Specifically focusing on the advances in DNA we recall that those early DNA tests required a crime sample somewhere, the size of a 50p piece. The DNA 17 test is many times more sensitive and requires the harvesting of only around eighty cells to begin the process. This is in the order of around 500 pg of material required in order to generate a standard result. I'm led to believe that DNA profiles may be obtained from as few as 15 cells depending upon the condition. So what might this mean for those undertaking scientific investigations in, what is sometimes referred to as, the investigative phase of the forensic process. To give you some ideas of the level of starting material – a single sugar crystal is in the in the order of 1 µg. Dividing this single crystal by 1,000 gives us somewhere in the order of 1 nanogram. Further dividing this by 1,000 gives us 1 pg and, as said previously our current tests require around 80 cells, in the order of 500 pg.

It almost goes without saying that the potential for adventitious transfer and/or contamination will increase proportionately to the sensitivity of DNA techniques.

Likewise, the passing of time may well increase the possibility of adventitious transfer. Recently, there is much commentary in the international press concerning difficulties associated with interpreting mixed DNA profiles. Likewise, we know that any mishandling of evidential material or mismanagement of the crime scene may very well change a single source sample into a mixture. This of course makes things many times more difficult for the DNA analyst to interpret. Likewise, it may turn a sample which may have given no result into a false positive. Whatever the case, and depending upon the level of contamination this may manifest itself as a major or minor constituent.

The potential for recovery

Those who have 'actually' examined and managed major crime incidents and, for that matter, the volume crimes of burglary *et cetera* will appreciate – what is sometimes referred to as the evidence funnel. This is a primary consideration when examining these incidents. We also must appreciate that the evidence which is collected, analysed, submitted and ultimately used in court will be a fraction of that which is collected. We know from experience and from our own reading that the basic activities of scene processing (Gardner 2004) can be summarised by the process diagram below.

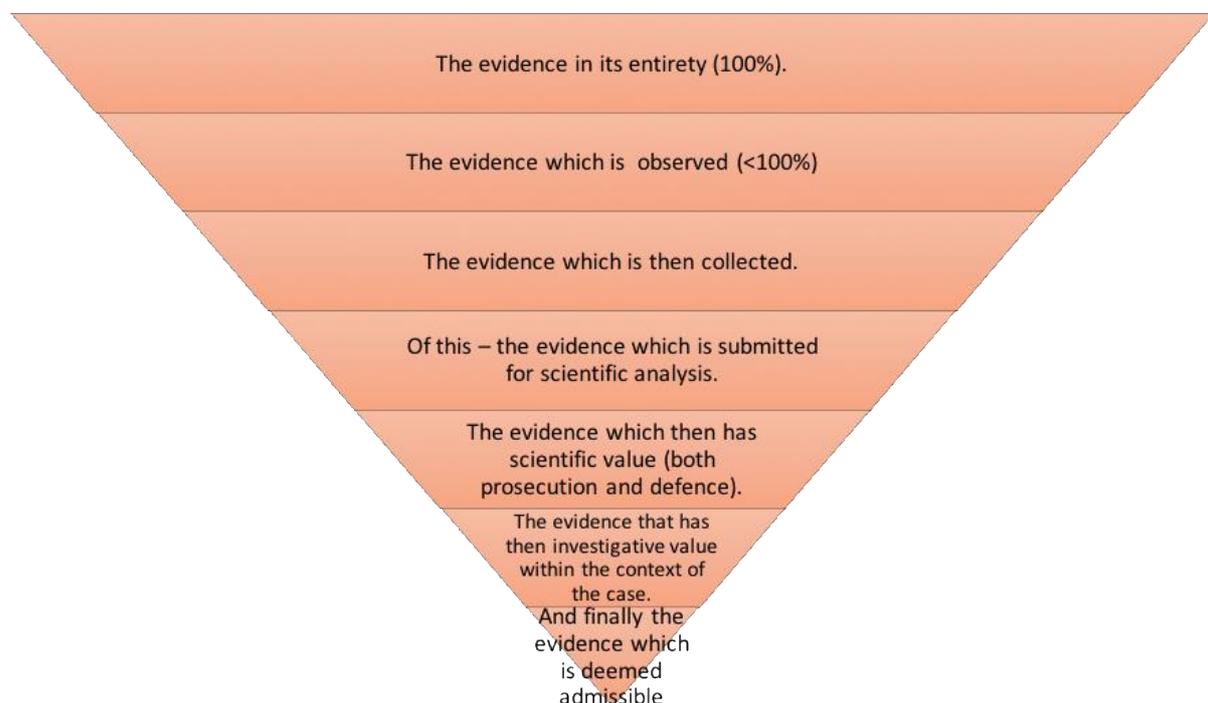


In this sense, one might conclude the importance of making an accurate and valid assessment based on the professional observations of the Crime Scene Investigator. So, of course we will need to act without delay but also bearing in mind the need to maximise the contribution of evidence recovery. Likewise, we know that some evidence types are transitory or fleeting. To quote Conan Doyle (A Case of Identity, 1891) it is the little things that are infinitely the most important. It is these little things that are sometimes most transient and yet so important in coming to a sound

judgement. By way of illustration, fibre evidence can at times be easily lost if it is not handled and managed appropriately.

And so, whilst these incidents must be processed carefully and rationally, it led me to wonder how the effects of speedy, yet careful processing might best support the criminal justice process. You will note here that I don't specifically cite the prosecution as, in my view, these incidents and the subsequent analysis must be examined with both the prosecution and defence hypotheses firmly in one's mind.

Its very clear from the outset that crime scenes are examined for two particular reasons. First and foremost – based on the likelihood and potential of forensic recovery and (where appropriate) subsequent loading of biometric material to our forensic databases. Secondly (and as importantly) is the service to victims of crime and to justice. For example, it is, in my mind unacceptable to leave the victim of a burglary offence waiting several hours for the crime to be examined. Logically of course the chances of recovery would diminish in proportion to the time elapsed although this is perhaps not always the case.



Transfer and persistence

One of the key areas of debate in forensic science nowadays is the issue of evidence transfer and how long various evidence types persist. We are dealing with ever smaller DNA material which, although is a really big step forward – it does mean that these small amounts are sometimes difficult to interpret – particularly if its been mishandled early in the enquiry and the consequent to become mixed or contaminated.

By way of illustration (and dealing with DNA alone) starting threshold to deal with DNA crime samples is just 500 pg. The previous multiplex double this. At around six cells per picogram needed just around 80 cells for the standard DNA test. Also (under the new multiplex) PCR cycles have increased which makes the system more sensitive and in to give better profiles from small and degraded samples. Again – all of this is very good but does increase the possibility of contamination.

To conclude

Perhaps somewhat unwisely reflecting on past experiences and the custom and practice of the time where a mantra of “... *we are not rushing to get this wrong*” was more commonplace the crime scene examiner of today is likely to be faced with the dilemma of speed, whilst at the same time ensuring that all of the physical evidence both macroscopic and microscopic are identified and recovered appropriately. Accepting the need for a sequential and systematic approach to research, recovery and submission of items – nevertheless parts of the forensic process now operate rather speedily. Likewise, we know that crime scene investigations are, in themselves a process (Horeswell 2004) comprising of an initial assessment and taking control of the incident. It does make sense that these steps, in particular are carried out as quickly as possible if we are not to encounter significant amounts of advantages transfer or contamination. The crime scene and investigative process continues with the examination, interpretation of items, pre-submission and post submission. It would seem logical to suggest that these should be speedy and efficient processes if the true value of the evidence is to be realised. The dilemma facing those who are, in this century, examining crime scenes is the requirement for a speedy result. Major enquiries/incident rooms have daily costs of many thousands of pounds. Combining this with the austerity measures facing several investigative authorities can perhaps appreciate the need to progress this quickly as possible. Nevertheless, we are aware of the dangers associated with the inadequate collection of physical evidence at the scene. In short, if it's not found then this can seriously undermine the course of justice. We know that potential evidence can be destroyed by carelessness or by examining these incidents with too much speed.