Lessons learned from “A Life in Crime”

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So you are a scientist?
So what does a forensic scientist do?

Predates the time of alphabet soup idscna
Problem was the scene

Measured effluent across the paper mill
Expected lot of variation across the factory

Found quite reproducible results
Wet water chemistry
Complexity of the scene
Murder of Lord Louis Mountbatten and others

Main evidence matching green paints
Court Experience

- Factual report; emphasis in report on technical details;
- Green paint – white paint – lots of paint
- Interest from the bench about the activity – didn’t recognize this at the time;
- Black jacket”
## Risk assessment - Crime scene to court

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Scene</td>
<td>Difficult to control</td>
<td>Implications for mistakes high</td>
</tr>
<tr>
<td>Transport</td>
<td>Easy to control</td>
<td>Implications for mistakes high</td>
</tr>
<tr>
<td>Prioritisation/</td>
<td>Interdependence</td>
<td>Mistakes reversible</td>
</tr>
<tr>
<td>Pre-assessment</td>
<td>needed for control</td>
<td></td>
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<tr>
<td>Testing</td>
<td>Controls variable</td>
<td>Implications for mistakes high</td>
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<tr>
<td>Report writing/</td>
<td>High inter dependence</td>
<td>Mistakes reversible if detected – serious if not</td>
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<tr>
<td>Interpretation</td>
<td>for control</td>
<td></td>
</tr>
<tr>
<td>Court</td>
<td>Difficult to control</td>
<td>Implications for mistakes high</td>
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</tbody>
</table>

### Accreditation

**Forensics@NIST**

#NISTForensics
QUALITY ASSURANCE IN FORENSIC SCIENCE*

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(1) The promotion of a uniformly high standard of performance by all concerned in situations which range from the examination of scenes of crime to the presentation of evidence in courts.
(2) The identification and correction of problems which arise.
(3) A continuing review of analytical methods, procedures, equipment and data in use in order to determine the best available.
(4) The education and encouragement of all staff, thereby ensuring an efficient and effective programme.
Accreditation

Quality system
Frame work for continuous improvement

Can be mistaken as guarantee for correct result

SOPs become too rigid
Everyone becomes too reliant on the value of the protocols and ignores judgement
Tasks are carried out to comply with the system rather than answer relevant questions
Personal responsibility/ownership abdicated to the system
Personal Experience

- Documentation becomes overly complicated
- Staff develop perceptions of what is in documentation
- Rigid adherence to protocols when judgement requires different approach
- Sticking plaster approach v root cause

Performance identified

The promotion of a uniformly high standard of performance by all concerned in situations which range from the examination of scenes of crime to the presentation of evidence in courts.

Journal article

Value of accreditation taken for granted. Not enough scientific skepticism in use. Not enough emphasis on “Why.”
But, you said to draw what is under the microscope....

Straightjacket or lifebelt
Principles rather than rule based approach
Learn from History?

- Forensic Science doesn’t have a good record in transferring learning from generation to generation or from discipline to discipline.
- Fiber work in FSL - consider methods of contamination avoidance.
- Visited laboratories with all work on one bench.
- Digital – manage information – relevance now the issue as with all other information.
- Lack of underlying principles the issue.
- Each new area considers the forensic issues as new to them.
"Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him. Not only his fingerprints or his footprints, but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only its interpretation can err. Only human failure to find it, study and understand it, can diminish its value." (8) So the physical objects preserved and the microscopic images or analytical maps of real physical evidence recorded are the heart and soul of forensic science, because they, themselves, do not lie.

"There exists in the field of criminalistics, a serious deficiency in basic theory and principles, as contrasted with a large assortment of effective technical procedures."

The ontogeny of criminalistics by Paul Kirk 1963
• Fixed situations where two items questioned and known are tested for comparison
• If any transfer is involved, need information over and above the physical or chemical properties of the items in question – need information on how likely are they to transfer and be detected to populate the numerator and how many other people in the population (however that population is defined) are likely to have such material to populate the denominator – activity information
• Smears in traffic accidents
• Multiple fragments in glass
• Types that shed in fibers
• DNA findings led?
• Changing – increasing number of reviews on transfer issues

Practical example from my work this year

- DNA – the holy grail
- So successful that it is pushed to the absolute limit –
- Consistent narrative ignored
- If measurement is taken out of context or becomes the total focus, we risk having a different type of problem
- Are we satisfied that a genotype taken from a complex mixture in a one off situation with no option of retesting is suited to the criminal justice system?
- The reality today is that the total focus on how we get a number from such a situation may completely miss the uncertainty issues which in turn have the potential to undermine the LR at source or sub-source level
Extensive blood stains DNA profile matching victim

Information that hammer used in attack

Is it reasonable to suggest that we cannot have the same confidence in DNA from each situation? Should we consider alternative propositions?
Aim for simplicity

- Locard “every contact leaves a trace” defines forensic science and is used outside the field.
- The actual translation from Locard “The truth is that none can act with the intensity induced by criminal activities without leaving multiple traces of his path---” gives us more insight. It has been explained (Roux et al., 2015) to be composed of three parts
  - “Nature of the criminal activity influences the types of material that are exchanged, and how they are dispersed in the environment
  - These materials, remnants of the activity, are the traces that become signs when detected, recognized, collected and measured
  - The interpretation process aims at transforming them into clues in order to reconstruct what occurred”

The implication of this is that more thought is needed about what to expect in given situations which is what we undertake when considering activity propositions

Also need to be conscious of what’s missing
A secretor status
Mixed stain – victim and suspect
Reaction only to be expected if from semen
Disagree - colleagues
Never asked – not disclosed

Review - “In many ways Dr Clift’s attitudes reflect those of the very early forensic scientists who saw their function as one of ‘helping the police’ and not as I believe a modern forensic scientist would see it (a) to assist police in their investigations and (b) to assist in the cause of justice in the courts.” “Mick Hamer, ‘How a forensic scientist fell foul of the law’, New Scientist, 3 September 1981, pp. 575–6.

What to disclose
<table>
<thead>
<tr>
<th>Type of reports</th>
<th>Technical reports</th>
<th>Investigative reports</th>
<th>Evaluative reports</th>
<th>Intelligence reports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristic</strong></td>
<td>Factual</td>
<td>Explanations</td>
<td>Comparisons</td>
<td>Linking series</td>
</tr>
<tr>
<td><strong>Use</strong></td>
<td>Often legal definition</td>
<td>Leads during investigation or explanations for findings</td>
<td>Comparing questioned and known samples or evaluate findings in light of competing propositions</td>
<td>Collating findings to provide data for evidence based policing</td>
</tr>
<tr>
<td><strong>Examples</strong></td>
<td>Level of active ingredient in a white powder; Level of alcohol</td>
<td>Explanation for blood pattern at a scene; “observations made on the cartridge case suggest that it has been fired by an ASTRA 9mm pistol.”</td>
<td>Comparison of DNA profiles; Glass fragments; Kicking versus walk by;</td>
<td>Patterns of fingerprints or footprints at scenes linked with various types of other findings – DNA, Partial marks</td>
</tr>
<tr>
<td><strong>Tools/mechanism</strong></td>
<td>Error rates, SD</td>
<td>Narrative</td>
<td>Likelihood ratio at source or activity</td>
<td>Computer programs</td>
</tr>
</tbody>
</table>
Lessons learned from a ’Life in Crime’

1. Forensic science as a discipline is not recognized partly because it is not well defined and means different things to different people and therefore progress is difficult

2. The lack of a common language works against progress, as does an agreed shared understanding of a common knowledge base

3. A lack of articulation and acceptance of principles prevents learning transferring from one generation to the next and from one discipline to another

4. There is not enough emphasis on the scene and how to communicate to the court

5. Accreditation is a valuable management tool but needs to be seen as continuous improvement and not used to stifle scientific curiosity

6. Education is key to progress and a strong code of ethics is needed across the field of forensic science

7. Leadership needed in the field – lot of noise from the outside

8. Blind acceptance or complete rejection of test methods is not helpful when the contribution is dependent on the question asked

9. Paradoxically the demand for more service is reducing the contribution from the service – more test results not always more answers

10. Need a system where science supports justice
Thank you very much for your attention