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## WHAT LAWYERS SHOULD AND CAN DO NOW THAT THEY KNOW ABOUT THE FORENSIC SCIENCES: A RESPONSE TO EDMOND'S 'WHAT LAWYERS SHOULD KNOW ABOUT THE FORENSIC "SCIENCES"'

### ABSTRACT

Accepting the fragility of forensic evidence exposed in recent reports and the risk of courts acting upon that evidence without a full appreciation of its limitations, this response focuses upon what lawyers and judges, in the light of this knowledge, can do to alleviate this problem, arguing that current evidential rules and processes, if approached with the rigour that the principles behind them demand, can go a considerable way to ensuring that the accused in a criminal trial is protected from forensic evidence being overvalued. Particular focus is given to evidential rules controlling the reception of forensic evidence – rules of relevance, rules controlling the admissibility of expert opinion evidence and the courts' residual discretion – and to the appropriate expression of forensic evidence if rigorous application of the common law criminal standard of proof is to be ensured. The prosecution's duties of disclosure, the adversarial nature of common law trial process, and the processes for appeal are also briefly considered as available to protect accused against unreliable forensic evidence. It is concluded that as a first response lawyers and judges are duty bound to invoke these protections to mitigate the risk of forensic evidence being overvalued.

### I INTRODUCTION: FROM KNOWLEDGE TO ACTION

At the very commencement of his article Edmond<sup>1</sup> quotes from an important report commissioned by the United States ('US') National Academy of Science (the '*NRC Report*'<sup>2</sup>) into forensic evidence and its use in US courts. The quote makes two points. First, it emphasises that the reliability of almost all forensic evidence has neither robust theoretical nor empirical justification and

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<sup>1</sup> Gary Edmond, 'What Lawyers Should Know About the Forensic "Sciences"' (2015) 36 *Adelaide Law Review* 33.

<sup>2</sup> Committee on Identifying the Needs of the Forensic Science Community, National Research Council, *Strengthening Forensic Science in the United States: A Path Forward* (National Academies Press, 2009) 53.

secondly, it asserts that courts are ill-equipped to expose this problem. In making this latter assertion four hurdles are referred to: (1) rules governing the admissibility of forensic evidence; (2) standards governing appellate review; (3) the limitations of the adversary process; and (4) the common lack of scientific expertise among the judges and lawyers who must try to comprehend and evaluate forensic evidence.

The principal recommendations in the report are directed at forensic scientists, seeking to ensure that they lift their game in justifying forensic evidence and be entirely frank about its limitations.<sup>3</sup> But it also directs attention to the courts' role and it is this role that is the subject of this response. The question is, now that lawyers and courts are aware of the fragility and limitations of forensic evidence, what steps can they take to ensure that forensic evidence is not overvalued, most particularly in the criminal trial. Can the hurdles mentioned above be negotiated to achieve this result?

In this response it is accepted that the fragility of forensic evidence exposed in the *NRC Report*, and others,<sup>4</sup> must be accepted by Australian courts.<sup>5</sup> It is also accepted that, like their US counterparts, Australian courts and lawyers have generally been too ready to receive forensic evidence,<sup>6</sup> and while there is no clear evidence of consequent systemic wrongful conviction in Australia,<sup>7</sup> individual examples can be found<sup>8</sup> and the precautionary principle alone demands closer

<sup>3</sup> Edmond reserves some of his most vehement criticism for the failure of forensic scientist to be entirely honest and transparent about their evidence in Part III(B) *When are the Forensic Analysts Planning to Come Clean?*, particularly at 83–4:

As a community, forensic scientists have been recalcitrant, sometimes duplicitous, in their failure to proactively concede notorious epistemic constraints and bring them to the attention of users, whether lawyers, judges or jurors ... The continuing silence, especially from leaders and managers, along with conscious omissions from expert reports and trial testimony, is nothing short of scandalous.

<sup>4</sup> Expert Working Group on Human Factors in Latent Print Analysis, *Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach* (US Department of Commerce, National Institute of Standards and Technology, 2012); Stephen T Goudge, *Inquiry into Pediatric Forensic Pathology in Ontario* (Queens Printer, 2008); Lord Campbell, *The Fingerprint Inquiry Report* (APS Group Scotland, 2011).

<sup>5</sup> Edmond, above n 1, 79 Part III(A) *Australian Exceptionalism?*

<sup>6</sup> *Ibid.* At 79 Edmond remarks that 'the kinds of issues raised in these reports emerge relatively rarely in trials and appeals in Australia and do not feature in the relevant jurisprudence.'

<sup>7</sup> Cf US. See, eg, Brandon L Garrett and Peter J Neufeld, 'Invalid Forensic Science Testimony and Wrongful Convictions' (2009) 95 *Virginia Law Review* 1.

<sup>8</sup> Recent cases where trial judges have admitted forensic evidence without adequate scrutiny include *Honeysett v The Queen* (2014) 253 CLR 122, *Fitzgerald v The Queen* (2014) 311 ALR 158, *Morgan v The Queen*, (2011) 215 A Crim R 33, *Gilham v The Queen* (2012) 224 A Crim R 22, *Wood v The Queen* (2012) 84 NSWLR 581.

scrutiny. In these circumstances, and as Edmond emphasises,<sup>9</sup> it is ultimately the professional responsibility of lawyers and judges to ensure so far as they can within their adversarial roles that forensic evidence is not given more evidential weight than it deserves.

The argument in this response is that current evidential rules and processes, if approached with the rigour that the principles behind them demand, can go a considerable way to ensuring that forensic evidence is not overvalued. Particular focus is given to admissibility rules and to the appropriate expression of forensic evidence if rigorous application of the common law standard of proof is to be achieved.

Edmond recognises that current rules and processes are available, and says that his paper:

aims to encourage prosecutors to reconsider their professional obligations and performances as ‘ministers of justice’, to embolden defence lawyers to challenge techniques and opinions that have not been evaluated (even if they have been uncritically accepted for decades) and to pay close attention to analytical processes and reports ...<sup>10</sup>

But he remains extremely sceptical of their ability to do this effectively. Resources (time and money) are recognised as a principal problem but he goes further and is critical of the very safeguards inherent in the common law accusatory adversarial trial and the ‘inexhaustible faith’ that judges have in them:

Trial safeguards and protections (and human rights instruments) can, in some circumstances, afford very effective means of identifying and presenting evidentiary weaknesses to the tribunal of fact. On most occasions they do not. In practice, trial safeguards and commitment to a fair trial often have more of a discursive or rhetorical flavour than a substantial one. Historically, trial and appellate judges have placed great store in the effectiveness of admissibility rules, the power of cross-examination, their own directions and instructions to the jury, along with the jury’s ‘common sense’. Notwithstanding this seemingly inexhaustible faith, none of these and other protections consistently nor effectively exposed the profound problems with many types of forensic science and medicine.<sup>11</sup>

<sup>9</sup> Edmond, above n 1, 85: ‘apprised of some of the problems and recommendations, lawyers and judges are now in a better position *and obliged* to respond to the reliability of expert evidence’.

<sup>10</sup> Ibid 38–9.

<sup>11</sup> Ibid 86.

The only hope that he sees is for ‘judges to begin to refine their admissibility jurisprudence and temper their, apparently misguided, confidence in the protections afforded by trial safeguards.’<sup>12</sup>

Strong words indeed. Is Edmond advocating the end of the common law adversarial criminal trial as we know it?<sup>13</sup> Or are his remarks directed only to the failure of the trial safeguards to reveal the infirmities of forensic science evidence? Even if forensic scientists lift their game, justify their analysis with strong theoretical and empirical support and present their conclusions with complete transparency, the evidence in the individual case will always require the scrutiny of trial safeguards. As with other evidence, error rates will always exist in forensic evidence and their effect must be assessed in the context of all the evidence in the particular case. To temper the protections afforded by trial safeguards is to lose confidence in the very fundamentals of the common law criminal trial whereby counsel for the accused is able to scrutinise fully the evidence put before the court.

It may be that ultimately (and then one suspects principally on grounds of efficiency and resources) we do have to rethink our system of trial, but first, in the light of the knowledge that they now have, lawyers and judges need to look more closely at the safeguards that are already available and see whether they can be more effectively used to protect against the frailties of forensic evidence.<sup>14</sup>

Edmond agrees that ‘apprised of some of the problems and recommendations, lawyers and judges are now in a better position *and obliged* to respond to the reliability of expert evidence’, but he does not explain whether and if so how current

<sup>12</sup> Ibid 39. His scepticism continues to his very final sentence where he says at 100:

With limited historical interest in the reliability of forensic science and medicine evidence, Australian courts have gradually and unwittingly placed themselves in a state of epistemic bliss. Perhaps a distant prospect, our hope is that ‘Thought would destroy their paradise.’

<sup>13</sup> It seems that Edmond thinks that it is when he concludes at 100 that:

What should lawyers and judges do in response to continuing proffers of incriminating expert opinion evidence? First, they should be willing to ask questions and exclude evidence. More broadly, in consultation with independent multidisciplinary advisory groups, they should begin to experiment with new procedures that are more conducive to the longstanding goals of doing justice in the pursuit of truth.

<sup>14</sup> Edmond does not appear to rule out this more conservative approach, despite his scepticism, commenting at 95:

In making this claim about the near universal misuse of forensic science and medicine evidence, it is not my intention to suggest that all or even most of these convictions are mistaken. In the vast majority of cases we do not know for certain that a particular person is guilty. Even so, many past convictions were compelling without forensic science and medicine evidence, and sometimes weak forensic science and medicine evidence may have contributed to compelling cases. The concern is that people have been convicted in circumstances where real limitations with evidence were not disclosed and where there were real dangers that evidence was cross-contaminated and trial judges, appellate judges and jurors were not genuinely alive to these significant threats to proof.

evidential rules and processes can function to permit such a response.<sup>15</sup> He asserts that '[a]ctual reliability would seem to be a condition precedent to admission' without explaining what he means by 'actual reliability' nor whether 'actual reliability' is already demanded by admissibility rules.<sup>16</sup> One cannot but accept his conclusion that 'inattention to reliability places decision-makers in an impossible position and subverts the goal of doing justice in the pursuit of truth', but this proposition applies to all evidence. And it would be surprising if the common law trial encouraged this inattention.<sup>17</sup>

## II ADMISSIBILITY RULES ENABLING THE CLOSE SCRUTINY OF POSSIBLY UNRELIABLE FORENSIC EVIDENCE: RELEVANCE, OPINION AND DISCRETION

### *A Relevance*

Courts are no strangers to the tender of possibly unreliable evidence. But the common law's approach has been to leave, so far as is possible, determinations of probative weight to the trier of fact (whether judge sitting alone or jury). If evidence is relevant, that is, capable of rationally affecting the probability of a fact in issue in the case, then it is presumptively admissible and can be put before the trier of fact.<sup>18</sup> Relevance is a role-defining concept, but can it provide a vehicle for the careful scrutiny of forensic evidence and perhaps lead to its exclusion?

Forensic evidence is commonly regarded as evidence of opinion but this is not necessarily the case. The very basis of forensic testimony is often observations made by the forensic witness. The fingerprint examiner testifies to similarities observed between a latent print of the accused and a latent fingerprint found at the scene of the crime; the DNA expert testifies to bands observed following spectrographic analysis of a forensic sample containing DNA and compares the location of these with bands in a sample from the accused. While the fingerprint examiner can make her observations with the naked eye enhanced only by magnification, the DNA analyst makes observations on the basis of a process that requires a much more sophisticated scientific justification.

Where the ability to make significant observations depends upon a special skill then it would seem logical that evidence of the witness's ability to make those observations be before the court if the observations are to be relevant. For this to be the case there must be evidence of the knowledge enabling the observations before the court,

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<sup>15</sup> Ibid 85.

<sup>16</sup> Ibid.

<sup>17</sup> Ibid.

<sup>18</sup> See ss 55–6 of the Uniform Evidence Acts: *Evidence Act 1995* (Cth); *Evidence Act 2011* (ACT); *Evidence Act 1995* (NSW); *Evidence (National Uniform Legislation) Act 2011* (NT); *Evidence Act 2001* (Tas); *Evidence Act 2008* (Vic), hereafter referred to as the 'Uniform Evidence Law.'

and evidence that the particular witness has that knowledge, before the fact-finder is in a position to rationally decide whether to accept the witness's observational testimony. Without such evidence the observational testimony cannot be capable of rational acceptance by the fact-finder.<sup>19</sup> In this sense the evidence of the knowledge and experience *authenticates*, that is makes *relevant*, the testimony of the matters observed.

Having made these observations the witness will then generally be asked to testify whether the forensic sample can be said to 'match' a sample from the suspect and, it is to be hoped, to explain exactly what the witness means by a 'match'. In the case of fingerprint evidence, up until now, courts seem to have accepted that a declaration of a 'match' is just that, an all or nothing match. What the recent reports show, and Edmond emphasises, is that this cannot be so, that there must always be a degree of error, that this should be based upon empirical evidence relating to the accuracy of that particular examiner, and that the degree of error should be clearly put before and explained to the trier of fact. In the case of DNA evidence, as a consequence of the rigour of the science involved, courts require experts to explain a 'match' in terms not only of the simple observations of the witness but also by reference to population genetics and the probability of finding DNA of the profile observed in a randomly chosen member of a suspect population. For the nature and extent of the match to be put before the trier of fact again it must be *authenticated* by evidence capable of rationally supporting the existence of the knowledge upon which the examiner relies to make the observations in question as well as the justification for any population analysis which seeks to explain the nature of the match and its consequent probative value. Without evidence of appropriate authentication again the jury will have no rational basis upon which to determine the relevance of the evidence being given by the examiner.<sup>20</sup> Of course, as forensic knowledge gains empirical and theoretical justification there may be no practical reason for disputing relevance on this basis, but where forensic knowledge remains dubious the point is that the concept of relevance provides counsel with a vehicle to argue that the evidence be excluded as irrelevant.

Other forensic evidence might illustrate how this vehicle could be used. For example, in the case of suspects depicted on video surveillance it is often impossible to make any definitive comparison with the accused, due to disguises worn by the suspect or simply due to the poor quality of the video images. In these circumstances prosecutors may call forensic 'experts' who claim, on the basis of simple experience, to be able to map bodily and facial features and observe whether the features and their

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<sup>19</sup> Some may be sceptical of this quest for rationality because they doubt the rational capabilities of juries. But, as the reasons required of judges sitting alone and of judges sitting on appeal show, rationality remains the basis of our justice system and judges and lawyers should not seek to persuade on grounds of mere emotion.

<sup>20</sup> As a practical matter as forensic knowledge gains empirical and theoretical justification it will not be disputed, but where this is not the case the point is that the concept of relevance does provide counsel with a vehicle to have the evidence excluded.

positioning on the images ‘match’ those of the accused. Furthermore, such ‘experts’ are prepared, and have been permitted, to ‘identify’ the accused from these features.

The problem with this forensic evidence is determining whether any of it can be authenticated as relevant. As evidence of simple observation it might be argued that experience and rigorous examination itself authenticates its relevance. But only as evidence of the simple observations. To seek to use these observations to draw a conclusion of identity involves a further step in the chain of relevance and requires separate authentication to satisfy the test of relevance. The difficulty here is that there is no theoretical or empirical basis for the separate authentication of this identification evidence. All that can be rationally said is that particular observations have been carefully made, that these cannot exclude the accused’s involvement, that in this sense the features in the image might be said to ‘match’ those of the accused, but the expert has no idea how many other possible suspects might also be matched by these features. To say anything further is to provide irrelevant evidence, evidence that cannot be rationally used to establish the accused’s connection with the crime.

While some might regard my assertions about the nature of relevance as being controversial, it cannot be denied that the nature of relevance is far from definitive, both at common law and under the Uniform Evidence Law. At common law, relevance is often described in terms of ‘sufficient relevance’ or evidence ‘worth considering’, perhaps confusing notions of relevance and sufficiency, but emphasising that relevance does embrace a degree of sufficiency wide enough to embrace the approach here advocated. Under the Uniform Evidence Law relevance is defined in s 55 as ‘evidence that, if it were accepted, could rationally affect (directly or indirectly) the assessment of the probability of the existence of a fact in issue in the proceeding.’ The principle behind this definition is that the evidence be capable of rationally affecting the probability of the existence of a fact in issue in the proceeding. The principle of rationality is expressly endorsed.<sup>21</sup> Furthermore, in this context it makes no sense to say the phrase ‘if it were accepted’ means it could be accepted unless ‘it’ is similarly capable of rational acceptance. Thus relevance depends on capability of rational acceptance and evidence based on knowledge or skill is not capable of rational acceptance unless there is evidence from which that knowledge and skill may be established. The evidence requires authentication before it can be relevant.

I suspect that some readers may think the distinction drawn above between the relevance of evidence of observations and the relevance of evidence of identification made upon the basis of those observations as being unrealistic, and that, even with directions from the trial judge, no trier of fact will fail to understand that observational evidence has been tendered to identify the accused. If the risk of it being used as identification evidence where there is no rational evidential basis for it being so

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<sup>21</sup> Of course, while law-makers might demand triers of fact to act rationally whether or not they (particularly juries) so do in practice is another matter. But while the idea of reason is a complicated concept its assumption remains fundamental.

used is too great, of course the residual ‘discretion’<sup>22</sup> might be invoked to exclude the evidence altogether as being more prejudicial than probative.

But it is important that the first protection against unreliable forensic evidence be the hurdle of relevance, some probative value that can be *rationally* assessed, and that the party tendering forensic evidence based upon expert knowledge must satisfy the court that there is evidence before the court capable of rationally supporting the existence of this knowledge. While the discretion provides further protection it is less definitive to invoke and the burden lies upon the party seeking exclusion to justify its exercise. It is more effective for lawyers and courts to scrutinise the reception of forensic evidence using a rigorous concept of relevance rather to rely upon a more uncertain residual balancing process.

### B *Opinion*

But there remains another avenue for the exclusion of forensic science evidence: that evidentiary rule which excludes evidence of opinion, of inferences drawn from observational evidence. It can be readily seen that the evidence of a forensic witness that samples or images contain relevant similarities and that these ‘match’ those from the accused is evidence of inferences drawn from observations, that the observations are of similarities able to identify and that the sum of the similarities is sufficient to identify the accused. At common law, evidence of opinions of this sort are generally excluded unless the witness is qualified through experience or training to draw such inferences and can thereby assist the trier of fact in reaching a more accurate and reliable decision (although interestingly an exception is made both at common law and under s 78 in the case of eyewitnesses where inferences – not reliant upon expert knowledge – are necessary for the witness to testify to the matters observed, for example eyewitness testimony of identification). Regrettably s 79 of the Uniform Evidence Law, which also exceptionally permits opinions from experts, does not specifically provide that the ‘specialised knowledge’ required to justify expert opinions must assist the quest for accuracy. And courts continue to refuse to read this quest into the requirement of ‘specialised knowledge’ by regarding a notion of reliability as inherent in the very idea of knowledge.<sup>23</sup>

But reliability does not mean that the knowledge is reliable in the sense that it can produce a definitive conclusion in every individual case. As the reports discussed by Edmond recognise, forensic knowledge<sup>24</sup> is at best probabilistic (even DNA evidence). Reliability means there must be good theoretical or empirical reasons for

<sup>22</sup> At common law exclusion is regarded as a matter of ‘discretion’ but under the Uniform Evidence Law the s 137 exclusion is mandatory once the probative value is ‘outweighed’ by prejudicial effect.

<sup>23</sup> See most recently *Tuite v The Queen* [2015] VSCA 148 (12 June 2015).

<sup>24</sup> Indeed all knowledge!



accepting something as known – ‘good grounds’<sup>25</sup> or ‘demonstrable evidence’ as Edmond puts it.<sup>26</sup> Additionally, in the context of a criminal trial, the risks of error must be articulated so far as is reasonably possible so that the knowledge can be integrated into the criminal standard of proof.<sup>27</sup> Without valid reasons being given for accepting something as known, there is no rational way of assessing what probative value to give it in relation to the issues to which it is allegedly relevant. In the light of the knowledge we now have, and that Edmond endorses, about the limits of forensic evidence, one would hope that in the near future the High Court demands that ‘knowledge’ be based upon ‘good grounds’ so that some degree of reliability can be rationalised. While a requirement that can never be definitive, it does at least give trial judges the opportunity to scrutinise the basis of forensic evidence rigorously and rationally on a case by case basis. And it ensures that it is not simply enough that a witness has ‘knowledge’ beyond the trier of fact but that this ‘knowledge’ has a rational basis that enables the probative value of the forensic evidence to be rigorously assessed.<sup>28</sup> Only in this way can expert evidence assist the trier of fact to reach a more accurate decision. This must be the very reason for receiving expert evidence at trial.

How far we take this requirement is another matter. It is not clear whether Edmond would take it further in the case of forensic evidence and demand its empirical validation prior to tender; that is, require the justification of likelihood ratios and error rates through formal studies and experiments. Although he is scathing about accepting mere experience as a sufficient basis for the admissibility of forensic science evidence,<sup>29</sup> he asks only that ‘good grounds’ be put forward for accepting that experience. This step would appear to be consistent with the notion of ‘good

<sup>25</sup> In *Daubert v Merrell Dow Pharmaceuticals Inc*, 509 US 579, 590 (1993), the US Supreme Court explained that “‘knowledge’ connotes more than subjective belief or unsupported speculation. The term “‘applies to any body of known facts or to any body of ideas inferred from such facts or accepted as truths on good grounds.’” See also *R v Tang* (2006) 65 NSWLR 681, 712–3 [138]–[139] (Spigelman CJ), 716 [159] (Simpson J), 716 [160] (Adams J).

<sup>26</sup> Edmond, above n 1, 84: ‘incriminating expert opinion evidence should be demonstrably reliable. Unreliable and insufficiently reliable techniques and opinions should be excluded.’ And at 94: ‘those presenting opinions derived from their experience [should] present “good grounds” – that is, demonstrative evidence – for believing that techniques and opinions are sufficiently reliable.’

<sup>27</sup> Discussed below at Part V Forensic Evidence and Proof Beyond Reasonable Doubt.

<sup>28</sup> Support for this quest for rigor in approaching expert evidence is found in *Dasreef Pty Ltd v Hawchar* (2011) 243 CLR 588 and in Heydon JA’s judgment in *Makita (Australia) Pty Ltd v Sprowles* (2001) 52 NSWLR 705.

<sup>29</sup> Edmond, above n 1, 94 where the author explains:

Experience is a convenient (and simple) heuristic that enables judges to defer to the accommodating decisions of earlier courts or the length of time a person (or institution) has been doing something, without ever having to consider validation studies, reliability and limitations. ... when it comes to forensic science and medicine – especially in response to forensic science techniques that are, or are likely to be, in routine use – experience (and long use) cannot support the weight of admissibility.

grounds' put forward here and leave the decision about the probative value of forensic evidence with the trier of fact. But at other points he goes further, saying the '[a]ctual reliability would seem to be a condition precedent to admission',<sup>30</sup> and (more ambiguously) that '[i]nattention to reliability places decision-makers in an impossible position and subverts the goal of doing justice in the pursuit of truth'<sup>31</sup> and (again more ambiguously) '[p]rosecutors and trial judges, as well as defence lawyers, are obliged to direct attention to formal evidence of reliability. A witness should not be able to vouch for her performance on the basis of long experience'.<sup>32</sup>

It is doubtful that experience should be rejected out of hand as an irrational basis for observations or inferences because it has not been subjected to empirical measurement. Ultimately experience is the touchstone for the assessment of the probative value of all evidence. Courts reject expression of proof as an enumerative concept.<sup>33</sup> Whether the criminal standard<sup>34</sup> is ultimately satisfied is left to the life experiences of the trier of fact as considered in relation to all the evidence before the court. Forensic evidence must not be overvalued, and enumerated likelihood ratios and error rates based on empirical evidence are always preferred, but if, in the absence of such empirical enumeration, the court is presented with forensic evidence based only upon experience, and 'good grounds' for that evidence are put before the court, then the trier of fact should not be prevented from considering it. It may be that such evidence cannot at its highest be decisive and juries should be directed about this, that there is an error rate leaving room for innocent explanations; but to exclude evidence for which good reasons can be given would involve a fundamental change to our current system of trial which leaves it to the trier of fact to assess the probative effect of 'good reasons'.<sup>35</sup>

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<sup>30</sup> Ibid 85.

<sup>31</sup> Ibid.

<sup>32</sup> Ibid 94.

<sup>33</sup> See Andrew Ligertwood and Gary Edmond, 'Expressing Evaluative Forensic Science Opinions in a Court of Law' (2012) 11 *Law, Probability and Risk* 289 and Andrew Ligertwood and Gary Edmond, *Australian Evidence: A Principled Approach to the Common Law and the Uniform Acts* (LexisNexis Butterworths, 5<sup>th</sup> ed, 2010) 110 [2.69]. For a more conceptual consideration of taking a mathematical approach to legal proof see Andrew Ligertwood and Gary Edmond, *Australian Evidence: A Principled Approach to the Common Law and the Uniform Acts* (LexisNexis Butterworths, 5<sup>th</sup> ed, 2010) ch 1.

<sup>34</sup> Discussed further below at Part V Forensic Evidence and Proof Beyond Reasonable Doubt.

<sup>35</sup> Edmond is of course a supporter of such fundamental changes as he is sceptical of the ability of our current system of trial to rationally assess forensic evidence: see Edmond, above n 1, 92–3. But he has no objection to judges and lawyers seeking to improve the way the current system treats forensic evidence: see, eg, Edmond et al, 'How to Cross-Examine Forensic Scientists: A Guide for Lawyers' (2014) 39 *Australian Bar Review* 174.

This approach does leave trial judges to assess good reasons from case to case. Edmond is critical of this ‘myopic’ approach.<sup>36</sup> But courts are concerned ultimately with the individual case. Their focus is neither the systemic analysis of forensic evidence, nor simply the question of its accuracy in the individual case. The focus is upon whether, having regard to all the evidence in the case, the accused can be found guilty beyond all reasonable doubt. Of course, the exclusion by courts of forensic evidence without empirical justification would prompt further research and experimentation to provide clearer evidence of its accuracy. But in the meantime an individual case would be deprived of evidence supported by good, if not decisive, reasons to consider when applying the criminal standard of proof. On this basis, fingerprint evidence might still be excluded as its formal empirical justification remains incomplete. But experience shows it is generally strong evidence, though not free from error, which the jury must then consider with other evidence to exclude this possibility of error before convicting an accused.<sup>37</sup>

It is clear that much empirical research remains to be done into the nature and reliability of evidence regularly put before the courts, in particular human testimony. It may be that one day this research will produce more definitive guidelines for determining credibility. But in the meantime trials must continue and decisions about guilt and innocence made on the basis of evidence for which there appear to be ‘good reasons’ for considering. As research reveals that there are ‘good reasons’ for particular types of forensic evidence, these reasons can be incorporated into the reception of that evidence through the current rules relating to relevance and opinion. And, consequent upon the reports discussed by Edmond, no doubt that research will accelerate and further empirical justification will be incorporated into the ‘good reasons’ for admitting that evidence.<sup>38</sup>

### C ‘Discretion’

At both common law and under the Uniform Evidence Law, evidence can be excluded if it is decided that its effect on the trier will be more prejudicial than probative. This residual rule is regarded as a ‘discretion’ at common law but s 137 provides that a judge ‘must’ exclude prosecution evidence where they so decide. While these semantic differences may produce different appellate consequences these rules have the same basis: to exclude evidence where the judge is of the view that, because of its prejudicial nature, there is an unacceptable risk that the trier of fact will, even with

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<sup>36</sup> Edmond, above n 1, 86:

The focus on the individual case and the rather myopic manner in which cases are tried and appealed, seem to have made it difficult for trial and appellate judges to appreciate (or respond to) some of the systemic dimensions at play across a wide range of techniques and practices.

<sup>37</sup> See below Part V Forensic Evidence and Proof Beyond Reasonable Doubt.

<sup>38</sup> Edmond, above n 1, 93, remains pessimistic: ‘Trials and appeals cannot sensibly address threats from human factors, other than to bluntly recognise their possibility though without a mechanism to gauge their impact (or substantially address the risks created) in the instant case.’

appropriate instructions, give the evidence more probative value than it deserves.<sup>39</sup> As explained above, it may be invoked to exclude forensic evidence where the trier of fact is likely to give the evidence excessive probative weight on the basis of the status of the witness rather than the capacity of the evidence. This approach necessarily requires judges to consider the rational probative capacity of the evidence and in this sense involves a determination of the reliability of the evidence and its limits.<sup>40</sup> It also requires the judge to ensure that the evidence is presented in such a way that the jury is able to understand any disputed basis of the evidence and its probative limits. It may be that judges remain too willing to accept the capacity of jurors to understand technical forensic evidence and its limits.<sup>41</sup>

### III OTHER PROCESSES AND SAFEGUARDS

In the above ways, admissibility of unreliable forensic evidence can be excluded under current rules. But the protections against the probative risks with forensic evidence do not manifest themselves at the admissibility stage alone. Rules already demand that prior to trial the parties, most significantly the prosecutor,<sup>42</sup> disclose in a timely fashion the forensic evidence they propose to tender. In this way an opponent is placed in a position to contest the evidence, either through seeking its exclusion or through informed cross-examination and the tender of countervailing evidence should the evidence be admitted. Where forensic evidence is admitted, the prosecution's duty of fairness demands that it be presented in a form that can be understood by the trier of fact. This requires forensic witnesses to clearly explain their expert knowledge and how it relates to their testimony of observations and admissible opinions. It is important that their testimony is transparent and that triers are not forced to determine the reliability of their testimony simply by reference to the apparent status of the forensic expert. This transparent approach can be reinforced by the trial judge, through demanding clarity of testimony and through final directions and comments to the jury.

As mentioned above, Edmond seems to have no faith in these further processes, although, perhaps in optimistic resort, he has recently been instrumental in the

<sup>39</sup> See further Gary Edmond et al, 'Christie, Section 137 and Forensic Science Evidence (After *Dupas v The Queen* and *R v XY*)' (2014) 40 *Monash University Law Review* 389.

<sup>40</sup> See also J D Heydon, LexisNexis, *Cross on Evidence* (at 31 May 2015) [2000] interpreting the apparently different approaches of the New South Wales (*R v XY* (2013) 84 NSWLR 363) and Victorian (*Tuite v The Queen* [2015] VSCA 148 (12 June 2015)) Courts of Criminal Appeal.

<sup>41</sup> Cf the upholding of the trial judge's ruling on the discretion in *Tuite v The Queen* [2015] VSCA 148 (12 June 2015).

<sup>42</sup> Edmond has elsewhere argued that prosecutors have responsibilities of fairness extending beyond mere disclosure and should abstain from tendering forensic evidence of dubious probative value: see Gary Edmond, '(Ad)Ministering Justice: Expert Evidence and the Professional Responsibilities of Prosecutors', (2013) 36 *University of New South Wales Law Journal* 921.

publication of a guide to the cross-examination of forensic experts.<sup>43</sup> It may just be, now that they are on notice, lawyers will use trial safeguards to at least ensure the disclosure of the fragility of forensic evidence to the trier of fact. Indeed, given the devastating criticism of forensic evidence in the *NRC Report*, one wonders how any prosecution forensic evidence will ever be regarded as decisive, as adequate cross-examination should now always disclose the existence of significant error rates. In the case of DNA, while the chances of a random match can be precisely calculated, human errors in the processes of investigation and analysis of DNA will reveal risks of error of more uncertain degree. With most other forensic evidence, error rates of uncertain degree will also remain, but while most may not be precisely calculated, the revelation of their very existence will compel triers of fact to seek evidence to exclude the reasonable possibility of error.

It is difficult to see the problems of contextual bias discussed by Edmond being eliminated.<sup>44</sup> At one level they are inherent in a system of trial dependent upon human testimony. It is difficult not to agree with his conclusion that

the issue of bias and the cross-contamination of evidence are difficult to manage at trial. In particular, subtle exposure and contamination are often difficult to trace retrospectively. Because effects tend to operate below the threshold of consciousness they are difficult to explore through cross-examination.<sup>45</sup>

Courts must rely upon forensic processes being conducted in environments as free as possible from bias and cross-contamination. Then it remains the role of the trier of fact to determine the effect of bias and cross-contamination upon the credibility of a forensic witness having regard to all the evidence in deciding whether the accused can be found guilty beyond reasonable doubt. Some might argue that this provides sufficient safeguards for an innocent accused.

#### IV THE PROBATIVE LIMITS OF A ‘MATCH’: ENSURING THAT TRIER OF FACT UNDERSTAND THE LIMITS OF ADMISSIBLE FORENSIC EVIDENCE

Of crucial importance is that triers of fact understand the significance of evidence of a ‘match’. As explained above in the context of discussion of the concept of relevance, a ‘match’ can never be definitive identification; even DNA evidence, the most empirically and theoretically justified evidence of identification, remains subject to generally unquantified human error in the collection and analysis of the forensic samples. Where no theoretical or empirical basis is provided for forensic identification evidence and the evidence has been admitted, the trial judge can and should ensure that the testimony is confined to mere observations and, even if the

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<sup>43</sup> Edmond et al, ‘How to Cross-Examine Forensic Scientists: A Guide for Lawyers’ (2014) 39 *Australian Bar Review* 174.

<sup>44</sup> Edmond, above n 1, 88 Part III (E) Bias and Cross-Contamination.

<sup>45</sup> *Ibid* 90.

defence concedes that none of these exclude involvement of the accused, emphasise that observed similarities are no more than evidence leaving open the possibility of the accused's involvement, and cannot alone implicate the accused in full satisfaction of the criminal standard.

As explained above, forensic evidence based upon knowledge and skill should not be admitted at all unless there is evidence of that knowledge enabling the probative value of the evidence to be rationally assessed. Thus, in the absence of evidence of a theoretical or empirical basis, the only relevant evidence a forensic expert can give is of observations requiring no such basis. Of course, if this is the situation it is likely that the trier of fact will be in a position to make the observations itself, for example to view video images and compare them with the accused. In these circumstances there is no reason to call a third party to testify to observations. Counsel can draw the trier's attention to the possible observations and inference to be drawn. The risk of calling a third party is that she will be seen as an expert or some other person of apparent influence whose evidence should be accorded evidential weight for that reason alone. While it might be argued that the witness in these circumstances is able to give relevant evidence, the risk of the evidence being given undue weight, coupled with it being unnecessary and a waste of time, are extremely strong reasons for exclusion (discretionary at common law and demanded under s 137 of the uniform legislation).

## V FORENSIC EVIDENCE AND PROOF BEYOND REASONABLE DOUBT

Ultimately, of most importance in a criminal case is how the trier of fact uses forensic evidence in determining whether to convict. The standard is beyond reasonable doubt and guilt must be determined upon the basis of all the evidence before the court.

It is up to the trier of fact to determine the probative value to be given to the evidence, both individually and collectively. The rationality of this process is assumed but never clearly articulated in Australian courts. The standard of criminal proof is formulaically declared but explanation is generally forbidden, it being regarded as the sole prerogative of the trier, conceived as a jury, to apply this formula.<sup>46</sup>

However, in cases turning upon competing explanations of circumstantial evidence juries can be directed that the criminal standard requires that they exclude reasonable hypotheses consistent with innocence before an accused can be convicted beyond reasonable doubt (the so-called *Hodge* direction).<sup>47</sup> But further explanation of the notion of 'beyond reasonable doubt' is disapproved and juries are not required to explain their decisions. Yet when judges sit alone and when courts sit on appeal,

<sup>46</sup> See generally Andrew Ligertwood and Gary Edmond, *Australian Evidence: A Principled Approach to the Common Law and the Uniform Acts* (LexisNexis Butterworths, 5<sup>th</sup> ed, 2010) 111–4 [2.70]–[2.72].

<sup>47</sup> *Hodge's Case* (1838) 2 Lewin 227; 168 ER 1136; *Shepherd v The Queen* (1990) 170 CLR 573, 579–80, 586 (Dawson J).

judges explain their decisions with as much rigour as they can muster as they seek to justify their decisions of both law and fact on rigorous rational grounds. When one looks at these explanations of the application of the criminal standard the process of proof is laid bare.<sup>48</sup> It is a process of hypothesis testing against the available evidence, and conviction cannot be justified until every reasonable hypothesis consistent with innocence has been excluded. This exclusionary approach is the touchstone of the criminal standard and there is no reason why it cannot receive emphasis when trial judges are explaining to juries how they should approach their task.

Furthermore, there are good reasons for trial judges to point out where evidence leaves room for innocent hypotheses, to direct juries to consider any reasonable hypotheses that consequently arise and to exclude them before they convict. This explanation is straight-forward and does nothing to undermine the criminal standard. On the contrary, it ensures that the criminal standard is rigorously applied.

Consequently when it comes to forensic evidence trial judges can and should explain to juries its non-definitive nature, that it necessarily leaves open the possibility of innocent explanations, that the jury must consider whether reasonably possible innocent explanations arise and exclude them before convicting the accused. The jury remains the arbiter of when an explanation is possible and reasonable, and whether it can be excluded so as to produce proof beyond reasonable doubt.

If the issue is identity, the trier can and should be told that forensic evidence, from fingerprint to DNA evidence, can never be 100 per cent definitive, that there is always a possibility of human error in any collection and analysis of the forensic samples and furthermore always a statistical probability, however slight, as in the case of DNA evidence, that the evidence could produce a match with another person who had an opportunity to commit the crime alleged. The task of the trier is to consider all the evidence to ask whether there is a reasonable explanation consistent with innocence and exclude it before conviction. A direction in these terms assumes that the processes for the tender of forensic evidence explained above have been followed.

Forensic scientists prefer to express evidential weight in terms of a likelihood ratio.<sup>49</sup> Using Bayesian analysis this ratio can then be used to calculate the effect of forensic evidence upon the prior probability of an event. But courts do not, as discussed above, determine criminal proof in some mathematical way.<sup>50</sup> Rather, hypotheses are compared, with the standard of criminal proof demanding that an accused cannot be convicted if a reasonable hypothesis consistent with innocence has not been

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<sup>48</sup> For an excellent recent example see the trial judgment of Martin J in *Western Australia v Rayney [No 3]* [2012] WASC 404 (1 November 2012), affirmed *Rayney v Western Australia* (2013) 46 WAR 1.

<sup>49</sup> See Guest Editorial, 'Expressing Evaluative Opinions: A Position Statement' (2011) 51 *Science and Justice* 1, 1–2.

<sup>50</sup> See, eg, Andrew Ligertwood, 'Forensic Science Expressions and Legal Proof' (2013) 45 *Australian Journal of Forensic Sciences* 263 <<http://www.tandfonline.com/doi/abs/10.1080/00450618.2013.782341>>.

excluded by evidence before the court. What courts are interested in are the opportunity for innocent hypotheses rather than the mere likelihood of a guilty hypothesis. On the other hand the forensic scientist is more interested in the evidential support for the guilty hypothesis. This may lead to detection of an alleged offender, and that offender may subsequently plead guilty, but if the offender pleads not guilty and demands proof the prosecutor must persuade the trier of fact that no reasonable hypothesis consistent with innocence remains. Scientists may be unhappy with this approach but it remains the touchstone for criminal conviction, recognising that the probabilistic calculation of guilt in a criminal case can never have a definitive empirical basis.

Even in the case of DNA evidence where the identity of the DNA sample is the determinative issue, courts cannot accept the proof of a match calculated mathematically, for this would be to accept that proof leaves open the chance, however small, that an innocent person has been convicted. However, where the statistical chances of a match with another person are extremely low, other evidence, including the failure of the accused to put up a credible innocent hypothesis, can be taken into account in deciding that the common law criminal standard has been satisfied.<sup>51</sup>

## VI APPELLATE SUPERVISION IN AUSTRALIA

In all Australian jurisdictions, appeal against conviction by an accused following trial by jury can be made on one of three grounds: that the verdict is unreasonable or cannot be supported by the evidence, that there has been a wrong decision on any question of law, or if on any ground there has been a miscarriage of justice.<sup>52</sup> By way of proviso even if any of these grounds are established the court may dismiss the appeal if satisfied that there has been no substantial miscarriage of justice.<sup>53</sup>

The first ground focuses on the factual question of whether the evidence is able to support conviction beyond reasonable doubt. The other grounds concern errors of law or other wrongful decisions made during the trial that have caused a miscarriage of justice. The proviso applies if the court is satisfied that despite an error or other wrongful decision during trial, having regard to the strength of the evidence in the case the jury would inevitably have convicted, that is, would not have entertained

<sup>51</sup> See further Andrew Ligertwood, 'Can DNA Evidence Alone Convict an Accused?' (2013) 33 *Sydney Law Review* 487.

<sup>52</sup> On grounds for appeal generally see Andrew Ligertwood and Gary Edmond, *Australian Evidence: A Principled Approach to the Common Law and the Uniform Acts* (LexisNexis, 5<sup>th</sup> ed, 2010) 58–61 [214]–[2.15].

<sup>53</sup> *Criminal Appeal Act 1912* (NSW) s 6; *Criminal Code Act* (NT) sch 1 ('*Criminal Code* (NT)') s 411; *Criminal Code Act 1899* (Qld) sch 1 ('*Criminal Code* (Qld)') s 668E; *Criminal Law Consolidation Act 1935* (SA) s 353; *Criminal Code Act 1924* (Tas) sch 1 ('*Criminal Code* (Tas)') s 404(1); *Criminal Procedure Act 2009* (Vic) s 276 (this provision incorporates the proviso within the latter two grounds of appeal); *Criminal Code Act Compilation Act 1913* (WA) sch 1 ('*Criminal Code* (WA)') s 689.



any reasonable doubt as to the accused's guilt. Thus it also focuses on the factual question but asks not whether the jury could have convicted but whether it would have convicted. Whether there is any difference in these tests is doubtful as in both situations the appellate court will ask whether a reasonable doubt remains open on the evidence, and will answer that question on its own assessment of the evidence on the record.<sup>54</sup> Thus the proviso effectively has no application if the first ground is made out. Nor will the proviso be considered in cases where there has been an error regarded as fundamental to the fairness of the trial.<sup>55</sup>

An error of law occurs where evidence is wrongfully admitted so that if admissibility rules are approached to demand more rigour in the reception of forensic evidence then failure to ensure that rigour may oblige an appellate court to find that evidence received by the trial court was wrongly admitted, either generally or for a specific purpose.<sup>56</sup> However, given the proviso, the appeal may not ultimately succeed where the overall evidence is strong. It is unlikely that an error in admitting forensic evidence will be regarded as so fundamental to the fairness of the trial that the proviso should not apply. In deciding whether the accused would inevitably have been convicted without the inadmissible forensic evidence the appellate court will look closely at all the evidence in the case and make a decision on the basis of its understanding of this evidence.<sup>57</sup> In this way the appellate court can directly and rigorously supervise the jury's verdict.

The court can also rigorously supervise the verdict when it is claimed that the evidence cannot justify conviction. In reaching this decision the High Court of Australia has now made it clear that the appellate court must carefully analyse the record of all the evidence in the case and decide for itself whether it was open for a reasonable jury to be satisfied beyond reasonable doubt. The appellate court is not asked to put itself in the place of the jury but to make its decision upon its own analysis of the evidence. Thus 'a reasonable doubt experienced by the court is a doubt which a reasonable jury ought to have experienced.'<sup>58</sup> In this way again the appellate court can directly supervise the jury's verdict.

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<sup>54</sup> But see further the more detailed discussion by David Hamer, 'Wrongful Convictions, Appeals and the Finality Principle: The Need for a Criminal Cases Review Commission' (2014) 37 *University of New South Wales Law Review* 270, 282–4.

<sup>55</sup> Cf Bibi Sangha and Robert Moles, 'MacCormick's Theory of Law, Miscarriages of Justice and the Statutory Basis of Appeals in Australian Criminal Cases' (2014) 37 *University of New South Wales Law Review* 243 who complain that the Australian rules are too liberal in allowing trial errors creating unfairness to be trumped by applying the proviso.

<sup>56</sup> For a recent High Court example see *Honeysett v Queen* (2014) 253 CLR 122 (facial mapper unqualified). The Court adopted a similarly rigorous approach to expert evidence in *Dasreef Pty Ltd v Hawchar* (2011) 243 CLR 588 (medical expertise exceeded).

<sup>57</sup> *Weiss v The Queen* (2005) 224 CLR 300, 316 [41].

<sup>58</sup> *M v The Queen* (1994) 181 CLR 487, 494 (Mason CJ, Deane, Dawson and Toohey JJ).

These grounds give appellate courts considerable scope in supervising the admissibility and use of forensic evidence; although the decisions to be made are difficult. It is also interesting to note that while the High Court has in the past been reluctant to uphold appeals in cases involving forensic evidence, for example *Chamberlain v The Queen*,<sup>59</sup> in recent years a number of appeals (both in the High Court and in State Supreme Courts) concerning forensic evidence have been upheld despite the proviso.<sup>60</sup> It seems that the fragility of forensic evidence is already being taken more seriously.

The limitation of appellate process is that, once exhausted, there is no further recourse to the court for challenge by a convicted accused, even if evidence comes to light suggesting the accused's innocence. The common law doctrine of double jeopardy protects the acquitted accused and the convicted accused has no further recourse except to seek executive intervention. Traditionally this was by way of exercise of the common law prerogative to pardon. In all Australian jurisdictions executive intervention is permitted by statute, but in the majority of jurisdictions the decision to intervene remains with the executive alone.<sup>61</sup> In these jurisdictions the executive may exercise the prerogative to pardon, or invoke the assistance of the court through seeking its opinion on any question of law or fact, or remit the matter back to the court for its decision in application of the normal appellate processes. But with executive intervention affected by political considerations, in New South Wales the Supreme Court is empowered to order an enquiry or remit for appeal.<sup>62</sup> In South Australia, legislation now simply allows a convicted accused to apply to the court for leave to bring a further appeal on the ground that there is fresh and compelling evidence suggesting the jury's verdict should be overturned.<sup>63</sup> This provides an important and direct avenue for the court to supervise the admissibility and use of forensic, and other, evidence.<sup>64</sup>

<sup>59</sup> *Chamberlain v The Queen [No 2]* (1984) 153 CLR 521.

<sup>60</sup> *Dasreef Pty Ltd v Hawchar* (2011) 243 CLR 588, *Honeysett Queen v The Queen* (2014) 253 CLR 122, *Fitzgerald v The Queen* (2014) 311 ALR 158, *Morgan v The Queen* (2011) 215 A Crim R 33, *Gilham v The Queen* (2012) 224 A Crim R 22, *Wood v The Queen* (2012) 84 NSWLR 581.

<sup>61</sup> *Crimes Act 1900* (ACT) pt 20; *Crimes (Appeal and Review) Act 2001* (NSW) ss 76–7; *Criminal Code* (NT) ss 431, 433A; *Criminal Code* (Qld) ss 18, 672A, 675; *Criminal Code Act 1924* (Tas) s 13 and *Criminal Code* (Tas) ss 398, 419; *Criminal Procedure Act 2009* (Vic) s 327 and *Sentencing Act 1991* (Vic) s 106; *Sentencing Act 1995* (WA) ss 137, 140.

<sup>62</sup> *Crimes (Appeal and Review) Act 2001* (NSW) ss 78–9.

<sup>63</sup> *Criminal Law Consolidation Act 1935* (SA) s 353A; *Magistrates Court Act 1991* (SA) s 43A.

<sup>64</sup> For a critical discussion of these various post-conviction avenues see Hamer, above n 54, 286–98.

## VII CONCLUSION

It is far from clear that Australian courts are ill-equipped to deal with the frailties of forensic evidence. First, the admissibility rules relating to relevance, opinion and discretion are open to interpretations permitting the rigorous consideration of forensic evidence, to ensure that it is based on theoretical and/or empirical grounds and that it is expressed transparently in a way that enables the trier of fact, with appropriate directions from the trial judge, to take it rationally into account when considering the criminal standard of proof. Secondly, standards governing appellate review (including post-conviction review) are open to interpretations that could ensure that forensic evidence is carefully scrutinised on appeal, not only to determine its admissibility and use but also in determining whether the criminal standard of proof has been satisfied. Thirdly, the adversary process may be limited by time and resources but it undoubtedly has the potential to provide a powerful scrutiny of forensic evidence. And finally, as far as the common lack of scientific expertise among the judges and lawyers who must try to comprehend and evaluate forensic evidence is concerned, one might argue that in many cases it is not necessary for laypersons (judges and juries) to follow all the technicalities of a forensic process and it is enough to appreciate the possibilities of error in determining admissibility and proof. It is only where the very basis of scientific evidence is being disputed that persons with a background in that area of science may be required to adjudicate the dispute.

While arguments continue about resources, and more fundamental changes may be advocated, the point is that it is time for lawyers and judges to bite the bullet. Given what we now know about the frailties of forensic evidence, all involved in the administration of justice have a role to play within their current capabilities. Forensic scientists need to ensure their evidence has strong theoretical and empirical justification, investigators that their processes for the collection of forensic samples are fool-proof, and forensic analysts that their processes are as free as possible from human error. But most crucially, prosecutors, defence counsel and judges need to use existing processes and admissibility rules to ensure that the worst unreliabilities of forensic evidence are avoided and that remaining risks of error are fully exposed so that the evidence can be as rationally and accurately integrated into the criminal standard of proof as possible. For prosecutors, defence counsel and judges this is their ethical duty towards the administration of justice. There is much to achieve.

