Neutral Citation Number: [2013] EWCA Crim 2
Case No: 2011/04122/C2, 2012/03728/B1, 2012/02955/D4

IN THE COURT OF APPEAL (CRIMINAL DIVISION)
ON APPEAL FROM :
CENTRAL CRIMINAL COURT
HHJ Gordon (Dlugosz)
CROWN COURT AT BIRMINGHAM
HHJ Chambers QC (Pickering)
CENTRAL CRIMINAL COURT
HHJ Pontius (MDS)

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 30/01/2013

Before :

PRESIDENT OF THE QUEEN'S BENCH DIVISION
LORD JUSTICE KITCHIN
and
MRS JUSTICE COX

- -

Between :

I Regina	**Respondent**
- and -	
Kuba Dlugosz	**Appellant**
II Regina	**Respondent**
- and -	
Pickering	**Appellant**
III Regina	**Respondent**
- and -	
MDS	**Appellant**

- -

Mr Oliver S P Blunt QC and **Mr Hugh Blake-James** for the **Appellant Dlugosz**
Mr Jonathan Laidlaw QC and **Mr Tom Little** for the **Respondent** in **Dlugosz**
Mr JA Butterfield for the **Appellant Pickering**
Mr PJ Cooper for the **Respondent** in **Pickering**
David Bentley and **Evans Amoah-Nyamekye (**instructed by **Birds)** for the **Appellant MDS**
Jonathan Rees QC for the **Respondent in MDS**

Hearing dates: 24 and 31 October 2012

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Judgment

THE ANNEX TO THIS JUDGMENT IS NOT TO BE PUBLISHED UNTIL AFTER THE RETRIAL OF MDS

The President of the Queen's Bench Division:

Introduction

1. In each of the trials from which these appeals have been brought, the judge was asked by the Crown to admit expert DNA evidence against the defendant where the evidence was Low Template DNA evidence and the DNA derived from a mixed sample to which at least two or three had contributed. In each case, 19 or 20 of the components of the appellant's DNA had been present in the mixture but the experts were unable to give a random match probability. The judge's decision to admit the evidence was the main issue in each of these appeals.

I The general approach

(a) Mixed profile

2. This court has considered Low Template DNA in several cases including *R v Reed and Reed, R v Garmson* [2009] EWCA Crim 2698, [2010] 1 Cr app R 23, *R v Broughton* [2010] EWCA Crim 549, and *R v C* [2010] EWCA Crim 2578. In *Reed and Reed,* this court referred briefly to DNA mixtures at paragraphs 50-51:

> "A sample may contain DNA from more than one person. This may be identified by there being more than two alleles at one or more of the loci tested. Where there is DNA from more than one person, it is often the case that one person will have contributed more of the DNA than another. That profile is referred to as the major profile and that person is referred to as the major contributor; the profile of the other or others is referred to as the minor profile and the provider of that profile as the minor contributor.
>
> If there are two contributors and four alleles at a locus, this will be because each of the persons has two different alleles at that locus. However, if the individuals have common alleles at a given locus, then they will overlap each other and not be shown separately. This is referred to as masking."

3. In *Garmson,* the appeal against a conviction for rape and sexual assault heard with *Reed and Reed,* there was a mixed profile, the major contributor being the female victim. The Crown sought to attribute the minor profile to the appellant; there were "foreign" alleles that could not be attributed to either, but the Crown's expert was able to calculate a random match probability, though this was challenged by the appellant at trial and on the evidence heard on the appeal.

(b) No statistics of random match probability available

4. In the first two appeals it was accepted that it was not possible to determine a random match probability. In the third (as we set out at paragraphs 99-100 below), the judge ruled inadmissible the evidence of Professor Balding, Professor of Statistical Genetics at University College London who had further refined his method of statistical analysis as applied to a mixed profile. In the result therefore, all three appeals proceeded on the basis that the DNA evidence was given without any of the experts being able to provide a random match probability, essentially because it was not possible to attribute particular alleles to any contributor. It was a further feature of each case, as is common in Low Template DNA cases that it was not possible to tell

when the DNA was deposited or how it had been deposited (whether by primary, secondary or tertiary transfer) or the origin of the DNA, such as skin or fluid.

(c) No evidence using the sliding scale of expressions

5. Nor were the experts who gave evidence in the trials of Dlugosz and Pickering from which these appeals originated prepared to give evidence using the sliding scale of expressions used in other areas of expert evidence such as handwriting, fibres, glass fragments, footwear patterns or "facial mapping". As Hughes LJ in giving the judgment of the Court in *R v Atkins & Atkins* [2009] EWCA Crim 1876, [2010] 1 Cr App R 8 pointed out at paragraphs 22-3, the sliding scale

> "does not have a scientific basis, in the sense of an arithmetical or numerical scale. It is simply a means of expressing a conclusion..
>
> But we do not agree that the absence of such a database means that no opinion can be expressed by the witness beyond his rehearsing his examination of the photographs. An expert who spends years studying this kind of comparison can properly form a judgment as to the significance of what he has found in any particular case. It is a judgment based on his experience. A jury is entitled to be informed of his assessment."

6. The expert in that case had set out a sliding scale or hierarchy with expressions ranging from "lends no support" to "lends powerful support" (see paragraph 8 of the judgment). The court concluded at paragraph 31 that an expert could express an evaluative opinion

> "by use of conventional expressions, arranged in a hierarchy, such as those used by the witness in this case and set out in paragraph 8 above. We think it preferable that the expressions should not be allocated numbers, as they were in the boxes used in the written report in this case, lest that run any small risk of leading the jury to think that they represent an established numerical, that is to say measurable, scale. The expressions ought to remain simply what they are, namely forms of words used. They need to be in an ascending order if they are to mean anything at all, and if a relatively firm opinion is to be contrasted with one which is not so firm. They are, however, expressions of subjective opinion, and this must be made crystal clear to the jury charged with evaluating them."

(d) Evidence as to whether the defendant might or might not be a contributor

7. There was no dispute in the first and third appeals that DNA evidence from a mixed profile could be used simply to establish that the defendant might have been a contributor or could not have been a contributor. It was accepted that it is often useful for a jury simply to know that fact without any further elaboration. What was in issue was what was necessary for an evaluative opinion to be given so that the jury could assess the significance of the DNA findings.

(e) Is statistical evidence required if an evaluative opinion is to be given?

8. It was the primary submission of the appellants in each case that unless statistical evidence of match probability could be given, then evaluative evidence should not be admitted. That was because the jury needed to have a firm basis on which they could evaluate the significance of the evidence given. In the absence of statistical evidence it was not possible to do so. The need for that firm basis had been spelt out in *R v Doheny; R v Adams* [1997] 1 Cr App R 369.

9. We cannot accept that argument. As is clear from the judgments in *Atkins and Atkins* (paragraph 23) and *T (Footwear Mark Evidence)* [2010] EWCA Crim 2439 (at paragraph 92) the fact that there is no reliable statistical basis does not mean that a court cannot admit an evaluative opinion, provided there is some other sufficiently reliable basis for its admission. As is clear from *Reed and Reed* and *R v Weller* [2010] EWCA Crim 1085, evaluative opinions were given in relation to the ways in which DNA could be transferred without there being any statistical database. We see no reason for concluding that evaluative evidence as to whether the profile can be attributed to a defendant or other person should be placed in a special category and should necessarily be excluded.

(f) Is a hierarchy of support required if evaluative evidence is to be given?

10. We therefore turn to consider the alternative submission that in giving an evaluative opinion an expert can only give evidence if he is able to use a hierarchy or sliding scale of support (as for example set out in *Atkins and Atkins).* It was submitted that if the expert cannot give his evaluative opinion using the hierarchy or sliding scale of support, then the evidence is inadmissible, as it does not have a sufficiently reliable basis.

11. It is essential to recall the principle which is applicable, namely in determining the issue of admissibility, the court must be satisfied that there is a sufficiently reliable scientific basis for the evidence to be admitted. If there is then the court leaves the opposing views to be tested before the jury: see *R v Reed and Reed* at paragraphs 111-112.

12. It was argued that there could not be a sufficiently reliable scientific basis, as the experts could not express an evaluative opinion by reference to the sliding scale or hierarchy. Although it was possible to state that finding all of a defendant's components in a mixed sample was "rare" or "somewhat unusual", this was an informal description and not objective scientific evidence. There was the real possibility that the fact that all of a defendant's components were present in a sample found at a crime scene might lead a jury to conclude that there was a match when plainly there was not; such a conclusion was possible if those specific terms were not used.

13. In *T,* the court concluded that in an area of forensic examination where no statistical calculation was possible, an expert could express an evaluative opinion based on his experience provided he made clear that the view was subjective and it was not claimed to be scientific (see paragraph 96). At paragraph 73 the court expressed the view that the use of the phrase from the hierarchy "lends moderate support for the prosecution case" was not an apt expression in the particular circumstances of that

case where all that could be said was that the mark could have been made by the defendant's shoe.

14. In our view, an expert is not bound to express an evaluative opinion by reference to the hierarchy; he can use other phrases. The real significance of the expert's inability to use the hierarchy might be that it is indicative of the lack of a proper basis on which to express an opinion. In our view, it can be no more than that. It is a matter to be taken into account in an assessment of whether there is a sufficiently reliable scientific basis for such an evaluative opinion to be given.

(g) The decision in R v Ashley Thomas

15. The Crown contended that it was not open to us to consider whether there was a sufficiently reliable scientific basis, as this court had determined that question in *R v Ashley Thomas* [2011] EWCA Crim 1295. It was the Crown's case at the trial of that case in June 2010 that the defendant had used a pistol to fire a shot into the groin of the victim. Part of the evidence relied on was a blood stain found on the underside of the pistol which had been recovered from a garden in circumstances where there was evidence to connect the defendant to the pistol. The DNA was a mixed profile which bordered the stochastic threshold; all of the components of the defendant's DNA were present; it was common ground that no statistical evaluation could be made. The Crown's expert expressed her opinion:

> "I have considered the following two propositions:
>
> - Ashley Thomas was a contributor and some of the DNA recovered was from him; or
>
> - Ashley Thomas was not a contributor and none of the DNA recovered was from him.
>
> If the first alternative were true, I would expect all of the components in Ashley Thomas' profile to be present in the mixed DNA result.
>
> If the second alternative were true, I would have a low expectation of finding components which matched all of the components of Ashley Thomas' profile in the DNA mixture, as simulation experiments have indicated that it is rare to observe all 20 components by chance alone.
>
> Therefore, in my opinion, the DNA profiling evidence provides support for the view that some of the DNA recovered was from Ashley Thomas, but I am unable to quantify the level of this support.
>
> Furthermore, I agree that there are many other combinations of DNA components in different profiles that could produce the mixed results obtained."

The simulation experiments to which she referred were unpublished simulation experiments by the Forensic Science Service which had shown it was rare to observe all 20 components by chance; the work had not been completed because of the ill-health of the scientist. The expert had not seen the details of the work and it had not been provided to the defence. The expert stated her own experience confirmed the conclusion of the simulation experiments, but she could not say what "rare" meant. The evidence of the defence expert was that the defendant could not be excluded as a contributor to the mixture, but it was going too far to say that some of the DNA might have come from the defendant.

16. The trial judge admitted that evidence. On the appeal, the court concluded that an expert assessment based on experience may be admissible even in the absence of statistical evaluation of likelihood, provided that the matter was approached with suitable caution and the nature of the assessment was made crystal clear to the jury. After expressing some concern about the unpublished experiments, the court stated:

> "39…[The Crown's expert's] credentials as an expert were not in dispute. Her opinion could not be said to have been so unreliable or so lacking in foundation as to make it inadmissible or to compel its exclusion in the interests of fairness. It was of potentially greater assistance to the jury to have this evidence than to be denied it altogether. The appropriate course was for the evidence to be adduced and then to be tested in cross-examination, so that its limitations and its weight could be assessed by the jury.
>
> 40. In the event, the practical effect of cross-examination in this case was to reduce virtually to vanishing point any significance that might otherwise have been attached to [the Crown's expert's] opinion. As the judge put it in summing-up … "she accepted that her findings really did not enable her to say that the defendant had handled the Baikal pistol". The difference between [the experts] became, to adopt the words used by [counsel for the Crown] in her submissions, almost a distinction without a difference. Despite all the attention given to it, the DNA evidence proved in the end to be a side-show. This, as it seems to us, was the result of the proper application of the adversarial process to evidence properly adduced. But it also means that even if, contrary to our view, the judge was wrong to allow [the Crown's expert's] opinion to be adduced, its admission into evidence can confidently be stated to have had no adverse effect on the safety of the appellant's convictions."

17. It is clear that in *Ashley Thomas* the court concluded that there was little difference between the experts and the DNA was not central to the safety of the conviction; it has been treated as such in the Royal Statistical Society's Practitioner Guide No 2: "*Assessing the Probative Value of DNA evidence"* (see paragraphs 6.22 and 7.7). We were also referred to the decision in *R v Nicholson* [2012] EWCA Crim 1568, particularly paragraphs 42-45 where a similar conclusion to that in *Ashley Thomas* was reached. In the first and third of the appeals the DNA evidence was central to the

safety of the convictions. We therefore consider we should re-examine the issue in the light of the much more detailed evidence now available.

(h) What is the proper basis for an evaluative opinion to be given in such cases?

18. In the first case (Dlugosz), the evidence of the expert for the Crown, Mr Shufflebottom, was that he had based his evaluative assessment on his experience derived from the many thousands of cases he had worked on either as the scientist or peer reviewer. His views had been peer reviewed (see paragraph 44 below). Dlugosz's expert, Mr Webster, had expressed a view based on his experience, but did not consider it scientific (see paragraphs 45-46 below). In the third appeal (MDS), the expert for the Crown, Miss Andrews, relied on her experience (see paragraphs 92-97 below).

19. It was clear to us that each of the experts who had expressed an evaluative opinion did so on the basis of experience, but that experience was not spelt out. We therefore asked for further details giving each party an opportunity to respond.

20. The Crown's expert in the first appeal (Dlugosz), Mr Shufflebottom, said in a statement provided to us after the argument that internal quality trials had taken place at the Forensic Science Service. They used known donors to create mixed DNA results, including Low Template DNA profiling results. He did not know if these results were in the forensic archive.

21. The Crown's expert in the third appeal, Miss Andrews, said (in a statement provided to us after the argument) that:

    i) She had reported on nearly 1,000 cases, many of which involved the interpretation of multiple STR profiles which were of a mixed nature and weak (low copy number); the details were held by her employers LGC Forensics.

    ii) She had interpreted mixed profiles in hundreds of cases where there was a known contributor. That gave her a sufficient level of experience and knowledge as to how a mixed profile can appear in such a case.

    iii) In cases where there was a mixed profile, she had not seen all 20 of the components of an individual's profile represented in a mixed profile when it was believed that the individual had no association with the item from which the profile was obtained. When she had compared the STR profile of a completely random individual to a mixed profile, she had never observed all 20 components matching by chance.

    iv) She referred to two simulation experiments – one conducted by the Forensic Science Service and presented by Buckleton, Triggs and Gill to a conference in Dublin in 2002 and one by Mr Mark Webster, the independent Forensic Scientist who gave evidence for the appellant Dlugosz. On his website he had published the results of simulation experiments which showed that the chance of all of the components of the profile of a non-contributor appearing in a 3 person mixed DNA profile was about 1 in 6500. Her understanding was that these simulation experiments were not based on Low Template DNA.

22. The response of Professor Krane (the expert for the defence in the third appeal) to Miss Andrews' further statement to us was that her statement was not grounded in experiments and data. It might well be possible to extract data from the thousand cases to produce a robust scientific or statistical conclusion. However the material she had presented did not enable an acceptable scientific conclusion to be reached.

23. The further material placed before us has elaborated the experience which it is said enables an evaluative opinion, however qualified, to be given. It is, we think, unfortunate that the experience to which Mr Shufflebottom and Miss Andrews refer has not been the subject of detailed study and evaluation. There can be no doubt but that this must be done as soon as possible by each of the commercial providers making all their data available for critical independent examination under the superintendence of the Forensic Science Regulator.

24. Nonetheless, it does seem to us that provided it is made clear to the jury the very limited basis upon which an evaluation can be made without a statistical database, a jury can be assisted in its consideration of the evidence by an expression of an evaluative opinion by the experts. We consider that on the materials with which we have been provided, there may be a sufficiently reliable scientific basis on which an evaluative opinion can be expressed in cases, provided the expert has sufficient experience (which must be set out in full detail in the report) and the profile has sufficient features for such an opinion to be given. If the admissibility is challenged, the judge must, in the present state of this science, scrutinise the experience of the expert and the features of the profile so as to be satisfied as to the reliability of the basis on which the evaluative opinion is being given. If the judge is satisfied and the evidence is admissible, it must then be made very clear to the jury that the evaluation has no statistical basis. It must be emphasised that the opinion expressed is quite different to the usual DNA evidence based on statistical match probability. It must be spelt out that the evaluative opinion is no more than an opinion based upon [the expert's] experience which should then be explained. It must be stressed that, in contrast to the usual type of DNA evidence, it is only of more limited assistance.

25. However, the fact that such evidence can properly be provided is illustrated by the first of the appeals where the Crown's expert, Mr Shufflebottom, expressed the view that finding all 20 components was "rare", whereas Mr Webster, Dlugosz's expert, preferred the expression "somewhat unusual". The fact that two very experienced forensic scientists were able to express that an evaluative opinion in similar, albeit general, terms illustrates that a limited evaluative opinion can properly be given. We have no doubt that such an opinion would be of assistance to a jury.

26. A paper by Dror and Hampikien (2011) 51 Science and Justice 204, sets out the results of a request to 17 independent DNA scientists to examine a mixed profile and then to express their opinions in terms "cannot be excluded", "excluded" or "inconclusive". The results were variable. As the paper points out, this demonstrates that there was no objective standard. We accept that. An evaluative opinion would necessarily in such cases be subjective, but that does not mean that it should not be admitted provided that there is a reliable scientific basis for it.

27. Even if it can be considered sufficiently reliable in cases where the experience of the expert is properly demonstrated and the profile makes it possible to give an evaluative opinion, there is, of course, the danger to which the defence experts referred, namely

that a jury might attach a false or misleading significance to it. Mr Webster pointed to the danger that it might debase the "gold standard" of DNA evidence. If there is such a danger, then, even though admissible, the court should decline to admit it under its powers under s.78. However we do not consider that there will generally be such a danger, provided the court sufficiently explains the basis of the evaluative opinion to the jury and its limitations as we have set out at paragraph 24 above.

28. We therefore conclude that, provided the conclusions from the analysis of a mixed profile are supported by detailed evidence in the form of a report of the experience relied on and the particular features of the mixed profile which make it possible to give an evaluative opinion in the circumstances of the particular case, such an opinion is, in principle, admissible, even though there is presently no statistical basis to provide a random match probability and the sliding scale cannot be used. We have therefore reached the same conclusion as was reached in *R v Ashley Thomas.*

(i) Presentation to the jury of DNA evidence

29. We would make a final general observation. In Dlugosz and MDS, the evidence was presented through the use of a written presentation handed to the jury explaining the basic science of DNA. We understand from counsel that it is now general practice to provide such materials to the jury. We would hope that, unless there are unusual circumstances, such written material will be provided. We were told, however, that no standardised version is available. We see great advantage in there being such standardised material. We hope that the Forensic Science Regulator in conjunction with the Royal Society and the Royal Statistical Society can assist in providing such material in a format understandable by a jury and in way that is not open to debate.

30. We turn to the facts of each appeal.

II. Dlugosz

31. On 23 June 2011 at the Central Criminal Court, before HH Judge Gordon and a jury, the appellant Dlugosz was convicted of burglary, robbery and manslaughter. He was sentenced to imprisonment for public protection with a minimum term of 7 years less time on remand. His co-defendant, Wyrostek had pleaded guilty to a count of burglary. The jury did not agree on the other counts. He was subsequently re-tried and convicted of manslaughter and robbery and sentenced to 9 years imprisonment less time on remand. The factual background can be briefly summarised.

(a) The burglary and the death of Miss Kelmenson

32. On 27 November 2008 the house of Miss Kelmenson, aged 83, at 3 Leweston Place, Stamford Hill, North London was burgled. On 1 January 2009 Miss Kelmenson was found dead in her house. She had been tied up and, being unable to free herself, had died from hypothermia. Her body was badly decomposed. Her ankles and wrists had been bound with silver tape and her mouth had been gagged with the same tape to stop her screaming. The house had been ransacked.

33. The police undertook a forensic examination. The police found no fingerprints. It was inferred that the burglars had worn gloves.

(b) The finding of DNA

34. The only forensic evidence found was a very small quantity of DNA on two of the three chisels at the premises. The amounts found were less than 200 pg (which is recognised as the upper end of the stochastic threshold for Low Template DNA testing).

35. The results showed mixed profiles. The police used a computer program known as DNABoost$_{tm}$ through which they identified two persons who might match the profiles obtained. One was Dlugosz. This was used solely for the investigation. It was not relied on as evidence and can be ignored.

36. He was arrested on 27 July 2010. When interviewed he answered 'no comment' to all questions. He was charged and remanded in custody.

(c) The intercepted telephone calls

37. Whilst he was in prison on remand a number of his telephone calls were recorded. On 15 September 2010 Szymon Wyrostek was arrested in connection with the same offence. There was no direct evidence against him but he was arrested on the basis that he was an associate of Dlugosz. After his arrest he told the police officer he admitted the burglary and admitted they put masking tape round Miss Kelmenson's feet. The comment was recorded in the police officer's notebook and signed by Wyrostek as accurate. The tape recordings of the Dlugosz's telephone calls referred to his DNA, anxiety at Wyrostek's arrest and what Wyrostek might say and planning the defence he, Dlugosz, would put forward.

(d) The trial

38. When the case came on for trial before HH Judge Gordon at the Central Criminal Court in June 2011, the evidence against Dlugosz was the DNA evidence to which we have briefly referred and the record of his telephone calls. In the course of the trial, the judge, after a *voir dire*, rejected the application to exclude the DNA evidence. The Crown then obtained leave to put Dlugosz's previous convictions before the jury. Dlugosz did not give evidence. After a clear and succinct summing up on 20 June 2011, the jury retired to consider their verdicts.

(e) The issues on the appeal

39. There were two issues on the appeal. First the question as to whether the judge should have admitted the DNA evidence. Second whether the judge should have admitted the evidence of previous convictions. As it is accepted that there would not have been a sufficiently strong case for the judge to have considered the admission of the previous convictions if the DNA evidence was inadmissible, we consider the DNA evidence first.

(f) The DNA profile

40. As we have mentioned, the quantity of DNA recovered was miniscule. Of the four samples, the largest yielded 119 picograms. The other three samples yielded less. The four DNA samples were subject to the full SGM+ method of testing. Although four samples were analysed, the debate at trial concentrated upon the two samples

from the blue chisel found at the house, chisel 2 – the handle (BRW/1/3) and the blade (BRW/1/4).

41. It was common ground that the testing method was reliable and the samples were suitable for analysis. It was also common ground that at least three people had contributed to sample BRW/1/3 and at least two people to BRW/1/4. It was also common ground that this was a complex mixture in which it was impossible to identify any major contributor.

42. A comparison was then made between the sample profiles and Dlugosz's known DNA profile. The results were as follows:

Sample	AMEL	D3	VWA	D16	D2	D8	D21	D18	D19	THO1	FGA
Kuba Dlugosz	X Y	17 17	17 18	10 11	18 25	12 13	31 33.2	12 17	13 13	6 9	22 23.2
BRW/1/3	X Y	16 17 18	15 16 17 18	10 11	17 18 25	12 13 15	29 30 31 33.2	12 17	12.2 13 14 15 16	6 7 9 9.3	21 22 23.2 25
BRW/1/4	X Y	16 17	16 17 18	10 11 13	17 18 25	12 13 15	29 31 33.2	12 15 17	13 14 15	6 7 9	22 23.2

43. A meeting between the expert for the Crown, Mr Lee Shufflebottom of the then Forensic Science Service and Mr Mark Webster of Forensic Science Consultancy for Dlugosz, took place on 14 April 2011 under the provisions of Part 33.6 of the Criminal Procedure Rules. They also agreed that the table accurately set out the alleles which were present in the DNA profiles obtained. They also agreed that all the components present in Dlugosz's profile were represented in the results obtained from BRW/1/3 (the handle of chisel 2) and in BRW/1/4 (the blade of chisel 2). Although the results could not be separated out to individual contributors, several of the alleles in the appellant's DNA were represented as prominent components. The experts were also agreed that it was quite impossible to provide a statistical/numerical assessment of the likelihood ratio.

(g) The area of dispute

44. It was Mr Shufflebottom's opinion from his experience gained since 2001 in the Forensic Science Service (in looking at hundreds, if not thousands, of results and audit checks) that it was "rare" to observe all the components of an individual's DNA profile in a complex mixed profile by chance. He accepted, however, that there were many other combinations of DNA components in different profiles that could produce the mixed DNA results obtained.

45. Mr Webster, who had been a forensic scientist since 1979 and acted in DNA cases since 1988, accepted that Dlugosz could have made a contribution to these samples. However, as the number of contributors to the DNA profiles could not be determined, it was impossible to resolve these mixed DNA profiles into individual DNA profiles of the contributors. It was therefore not possible to calculate a robust statistic indicating the strength of the link between Dlugosz and the DNA in the two samples.

Although they provided an investigative lead, they did not provide cogent evidence of Dlugosz's presence at the scene.

46. Mr Webster's view was that he would expect a random match of something between 6 and 11 alleles in a composite sample. He could not say how many people would be needed before he got by chance a complete match. He did not agree with the evidence of Mr Shufflebottom that it was "rare". He would prefer to say it was "somewhat unusual". He explained that there was no rigorous or objective quantifiable assessment, as none was possible. The number of experiments done was not enough to support a statistical evaluation. Using a subjective evaluation was to devalue the "gold standard" and it was not reliable.

(h) Mr Shufflebottom's evidence using "propositions"

47. In an attempt to be more helpful, Mr Shufflebottom expressed the following view:

> "To evaluate these results I have considered the following two propositions:
>
> - DNA from Dlugosz was present on the swabs; or
> - DNA from Dlugosz was not present on the swabs.
>
> In my opinion the DNA profiling results provide support for the presence of DNA from Dlugosz on the swab but I am unable to quantify the level of this support."

48. It appears that although his primary view was that, in his experience, it was "rare", as we have set out at paragraph 44, to observe all the DNA components of an individual's DNA profile in a complex mixed profile by chance, he thought it was necessary to express his opinion "that the scientific findings favour the view that DNA from Duglosz was present on the swabs rather than DNA from Duglosz was not present on the swabs."

(i) The application to exclude the DNA evidence

49. Mr Blunt QC on behalf of Dlugosz sought to exclude the evidence of DNA on the basis that without statistical evaluation, its significance could not be evaluated and therefore should not be placed before the jury. Without such a statistical basis, the evidence was also prejudicial as it had no quantifiable probative value. The Crown contended that Mr Shufflebottom should be entitled to give his own subjective opinion based on his experience; Mr Webster could then give his evidence as to the difference in degree between them. The judge concluded that, as in *Ashley Thomas*, the evidence was admissible and that its probative value outweighed its prejudicial effect.

50. In his commendably succinct and clear summing-up, the judge set out the three limitations inherent in this Low Template DNA evidence – it could not be said how the transfer had occurred; one could not tell the type of cells being analysed and one could not tell when the cells were deposited. He then summarised the issues on which the experts were agreed and then set out sequentially the evidence of Mr Shufflebottom and Mr Webster. He emphasised to the jury that there was no

statistical comparative figure and the jury would have to evaluate the different evidence given.

(j) Our conclusion on the admissibility of the DNA evidence

51. As we set out at paragraphs 18 and following above, the principal question was whether there was a sufficiently reliable basis for the expert to be able to express an evaluative opinion and that opinion therefore to be admissible. If the evidence was admissible, the second question was whether there was a risk that the jury might be misled in attaching a false weight to that evaluative opinion, bearing in mind the very substantial trust that can be placed on DNA evidence. The issues are distinct as we have set out and it is necessary for us to address each.

52. We consider that there was a sufficiently reliable scientific basis for an evaluative opinion to be given in the circumstances of this case. As we understand the evidence of Mr Webster, he considered that expressing a subjective opinion, which he in fact did, would detract from the "gold standard" of DNA statistical evidence. We appreciate that that is a danger, but that is the second issue to be addressed. The first issue is its reliability. It seems to us that on the general matters to which we have referred at paragraph 18 and following above and the specific evidence in this case, namely that all alleles were present and several were prominent components, there is such a reliable basis and the evidence was, in principle, admissible.

53. As we have set out at paragraph 28 above, we appreciate that juries could attach a false weight to DNA evidence where statistical evidence cannot be given. However, such a risk is no reason for excluding the evidence, providing that the nature of the evaluative opinion is clearly explained to the jury and it is made clear to them that the opinion is an evaluative one based on experience and not on statistics. In this case, we are satisfied that the jury were properly and fully directed by the judge in relation to that distinction; he very carefully explained the difference between DNA evidence where there was a statistical basis for providing a random match probability and the position in this case. The jury heard the evidence of the two experts and were, in our view, in a position to use that evidence in accordance with the clear and careful summing up, bearing in mind that the difference between the two experts was not that great, one saying it was "rare" and the other saying it was "somewhat unusual.

54. As we have set out at paragraph 47, Mr Shufflebottom went on to express his views in the form of two propositions. In the course of argument, Mr Laidlaw QC, on behalf of the Crown, accepted that this added nothing. We agree. In fact we would go further and say that it was not helpful. His evidence was that finding all components was "rare". That was sufficient.

(k) The evidence of bad character

55. Dlugosz had some previous convictions which the Crown sought to adduce under s.101(1)(d) of the Criminal Justice Act 2003 (CJA 2003) as relevant to an important issue. The Crown relied on s.103(1)(a) - the propensity of Dlugosz to commit offences of the kind with which he was charged.

    i) A conviction for a robbery committed by him and others at a school in Poland on 28 March 2000 by breaking in at night. The caretaker was told to lie on the

floor and his hands were tied behind his back with cable. When the robbers departed, they left the caretaker tied up.

ii) A conviction for a robbery committed 9 days later on 6 April 2000 in Poland at a school by breaking in at night. They tied the caretaker's hands tightly behind her back with sticky tape and gagged her mouth with the same tape. They stole items and departed. It was not clear whether she was left tied up.

iii) A conviction for a burglary carried out by him on 22 October 2008. He had come to England in 2007. Entry of a bakery was forced at night with a crowbar; a safe was stolen. Dlugosz was wearing latex gloves, but he tore one and so could be identified by his DNA. CCTV evidence also helped identify him. The premises were very near the house of Miss Kelmenson. He had pleaded guilty, saying he had been employed at the bakery and felt aggrieved because he had been underpaid.

iv) On 9 November 2008, Dlugosz and his co-defendant, Szymon Wyrostek, were arrested for attempting to burgle an unoccupied house in Ilford; both wore gloves and Dlugosz had two screw drivers and a torch. The house was owned by an elderly lady, but she was away. Police were called and they were arrested. Dlugosz pleaded guilty to criminal damage. The case for both was that they were looking for a squat.

v) On 13 November 2008, Dlugosz and another tried to force a wooden panel at a house close to Miss Kelmenson's house in the early hours of the morning. The occupier was woken. Both wore gloves and the other had a torch. No charges resulted. It was Dlugosz's case that he was trying to find a place to squat.

56. It was submitted on behalf of Dlugosz to the judge that the case on DNA was weak and the convictions should not be admitted to bolster a weak case. The judge carefully considered the three questions posed in *Hanson* [2005] 2 Cr App R 21. He held that the evidence of the two robberies committed at schools in Poland (convictions i) and ii)) should, despite their age, be admitted as establishing propensity; they had particular and similar features shared with the offences with which he was charged. Evidence of the burglary of the bakery (conviction iii)) was also admitted because Dlugosz was wearing latex gloves. Evidence of the criminal damage at Ilford (conviction iv)) should also be admitted as Dlugosz and his co-defendant were together and they had latex gloves. The evidence of the attempted break-in in the vicinity of Miss Kelmenson's house (item v)) would not be admitted as it added little. The four convictions were also relevant to other questions namely, whether he had entered the premises and committed the robbery in the way he had, whether there was an innocent explanation for the DNA on the chisels and how the telephone conversations should be interpreted. In looking at the overall issue of fairness, the judge concluded that Dlugosz could have a fair trial and the jury ought to know of the previous four convictions.

57. The judge carefully and clearly summed up to the jury the way in which the evidence of previous convictions could be used; there is no criticism of the summing up.

(l) Our conclusion on the issue of bad character

58. As we have stated at paragraph 39, it was accepted by the Crown in the argument before us that the bad character evidence would not have been admissible unless the DNA evidence was admissible as without the DNA evidence there was insufficient case against Dlugosz. As set out above, we have held that DNA evidence was admissible. However that decision does not preclude the forceful argument made by Mr Blunt QC on behalf of Dlugosz that the bad character evidence had to be examined with considerable care given the nature of the DNA evidence. What the judge had done, in his submission, was to consider the offences as if they were signature offences and thus not give the offences the scrutiny required under the CJA 2003. The effect of admitting the evidence was to give the jury the impression that this was an offender who had a way of offending; that, when added to the subjective opinion evidence on DNA, resulted in unfairness, as these convictions were being used to bolster an otherwise weak case. On analysis, the offences were not similar. The two Polish offences were robberies 8½ years before. The only burglary was that of a bakery where the safe was stolen.

59. In our view the judge was correct to admit the evidence. Dlugosz had tied victims up in the course of a night time burglary. He had committed a night time burglary wearing latex gloves and was in the area where Miss Kelmenson lived. Plainly the evidence as to the four offences was not strictly similar fact evidence, but it was well within the terms of s.101 for it to be admissible and the similarities were important. The judge correctly directed himself on the applicable principles and reached a conclusion that was open to him on the overall fairness of admitting the convictions.

(m) Our conclusion on overall safety

60. It was forcefully urged on us by Mr Blunt QC that there was a real danger in the present case that the jury had taken weak DNA evidence and then been prejudiced by the previous convictions of Dlugosz, particularly those that were 8½ years old. That is a forceful submission, but it seems to us, standing back and objectively considering the totality of the evidence, that the view of the experts on DNA that finding all of an individual's alleles in a mixed sample of the kind analysed in this case was either "rare" or "somewhat unusual", was of real assistance. Taking that evidence and the evidence of the telephone conversations, there was, in our judgment, sufficient for the evidence of previous convictions to be properly open to consideration in determining the guilt of Dlugosz. Taking all of that evidence together and the judge's careful, clear and fair summing up, we can see no reason to consider the convictions unsafe.

III. PICKERING

61. On 8 June 2012, the appellant Pickering was convicted at the Crown Court at Birmingham before HH Judge Chambers QC and a jury of one count of sexual assault on a girl under the age of 13. He was sentenced to 30 months imprisonment and a Sexual Offences Prevention Order made.

(a) The evidence of what occurred.

62. The appellant Pickering's partner, Lesley, had an arrangement with a friend, Samantha, under which they would baby sit for each other. On 9 September 2011, Samantha left her children, P (a girl of 12), D (a boy of 8) and M (a girl of 8) with Pickering and his partner for them to baby sit with their own child, C aged 6.

Between about 10.30 p.m. and 11.30 p.m. Lesley went to bed, leaving Pickering with the children. Pickering had consumed a quantity of beer.

63. It was P's evidence that whilst her brother was playing on the computer and her sister listening to music, Pickering tickled her and touched her vagina over her clothes. Later he got up and told her to come with him. They went into the kitchen and Pickering asked her if she wanted a drink. She declined. Shortly after, he lifted up her top and touched and sucked her breasts and gave her a love bite. He then pulled her top down and removed her lower clothing and began licking or sucking her vagina. He tried to do it again, but P pushed him away. She denied that Pickering had given her a "wedgie" and denied making the allegation up. She had told her sister N that night.

64. N also gave evidence. She had not seen Pickering tickle P or give her a "wedgie". She had gone to sleep. The following morning P had shown her a red mark on her neck and told her that Picking had sucked her breasts and vagina. P's father also gave evidence that P had told him of what Pickering had done; his evidence was that she was very upset and scared.

65. Pickering's evidence was that he had tickled his son, C, and P and given them both a "wedgie". He denied touching P inappropriately. Lesley also gave evidence that she had gone to bed, but was unaware the next morning that anything was wrong.

66. Pickering was charged with two counts of sexual assault on a child – count 1 in relation to touching her vagina over her clothes on the sofa in the living room and count 2 in relation to what happened in the kitchen - touching or licking her breasts and her vagina. The jury did not agree on count 1 but convicted him by a majority on count 2.

(b) The forensic analysis

67. Four swabs were taken from P's left breast, vulva and the knickers and the vest top that P had been wearing. They were sent for forensic testing by the Forensic Science Service. The findings were as follows:

    i) The knickers:

        a) Visible cream coloured staining was visible in the gusset. On analysis, amylase was found to be present in a high concentration. Amylase is a main constituent of saliva where it is usually present in high, though variable, concentrations. Although it is also present in other bodily fluids, a high concentration is indicative of the fluid being saliva.

        b) DNA profiling showed a mixed profile contributed by at least three people. All the components of the DNA profiles of P and all but one of the components of the DNA profile of Pickering were present. There were also two components definitely present and three other components possibly present that could not have come from P or Pickering.

ii) Left breast: It was not possible to determine if saliva was present. The DNA analysis showed the possible presence of DNA from more than one person. All of the confirmed components corresponded with the components in Pickering's DNA profile. The other components found matched the components of P's DNA profile.

iii) Vulva: It was not possible to determine if saliva was present. The DNA analysis showed the presence of DNA from more than one person. All of the components could have originated from either P or Pickering.

iv) The vest: It was not possible to determine if saliva was present. The DNA analysis indicated the presence of DNA from at least three people. All of the corresponding components from P and Pickering were present; there were also present components which could not have originated from P or Pickering.

(c) The report of the Crown's expert

68. Mr Stephen Paddock of LGC Forensics provided a report for the Crown. He stated that none of the DNA results were suitable for statistical analysis as there must have been at least one other unknown person who contributed to the mixed profile. He nonetheless offered an interpretation on the assumption that Pickering's DNA was present in the test samples and by reference to the differing accounts of P and Pickering as to what had taken place. He concluded that on the scenario that Pickering had licked P's left breast and vagina, the findings could entirely be explained by P's account. On Pickering's account, the findings were unlikely. He concluded that the results were more likely to be consistent with P's account than Pickering's account, but he could not express a view on the strength of the support as no statistical evaluation could be carried out.

69. The conclusions reached by Mr Paddock were reviewed by an unidentified expert instructed on behalf of Pickering. The report was not disclosed. There was no meeting with that expert and that expert was not called to give evidence.

70. At the commencement of the trial, the position of the Crown was that it wished only to adduce forensic evidence in relation to the knickers, both as to the presence of amylase and DNA. Mr Paddock's conclusion in relation to the DNA results obtained from the knickers was:

> "The presence of DNA from at least one unknown person meant that the DNA results from the knickers could not lead to any statistical evaluation in relation to [Pickering]. It may be that some or all of the DNA components and the mixture of DNA that matched the corresponding elements of Pickering's DNA profile do come from him or it may be that none of them do. Some could be from, or shared with, the unknown contributor or contributors. It is simply not possible to determine how many of the components should be taken into account."

(d) The judge's decision on admissibility

71. The position of Pickering was that the DNA evidence relating to the knickers should not be admitted. Although an objection was taken to the admissibility of the evidence of the presence of amylase, it was not pursued. As to the DNA, as no statistical evaluation could be performed, it was submitted that the evidence in relation to DNA should not be admitted. The inability to provide an objective "strength of support" scale opinion demonstrated that the conclusions were not scientific.

72. The judge ruled that the evidence was admissible, as the jury properly directed could assess the weight of the evidence. Provided it was relevant as being consistent with a person doing the act or not excluding a person, then it could be admissible as part of the overall relevant evidence. It could be assessed in the context of the evidence of amylase indicating saliva and was relevant as showing that Pickering could not be excluded.

73. The judge was told that in the event the DNA evidence was ruled admissible, counsel considered that they might be able to agree a statement which could be put before the jury. It was envisaged that this would set out the result of the DNA analysis which we have set out at paragraph 67.i) above and a broad conclusion to the effect that the components might have come from Pickering or they might not. The judge observed that he did not consider this a course that should be followed and that expert evidence should be given to the jury by Mr Paddock. The judge was in a difficult position as there had not been proper examination of the DNA evidence at the PCMH. Counsel for the Crown had only received the papers a week before the trial, as they had been returned from a Higher Court Advocate employed by the CPS.

(e) The evidence given by the Crown's expert

74. Mr Paddock gave evidence as part of the Crown's case. No written material of the kind to which we have referred at paragraph 29 was put before the jury during his evidence. It is very regrettable that it was not provided, as it would have very considerably shortened the evidence of Mr Paddock and made that evidence much clearer.

75. In the course of his evidence, during which the judge asked a large number of questions, Mr Paddock made clear that some of the components in the mixed profile had originated from an unknown individual; the components found which matched all but one of the components of Pickering's DNA profile might have come from Pickering, but some might have come from the unknown person. If he was to exclude Pickering, he would not expect all of his components to be present. The additional components did not assist in excluding Pickering from the result. It was possible that components matching Pickering's profile were there by chance, but what could not be evaluated was the possibility of them not originating from Pickering. He could not exclude secondary transfer, if after being given a "wedgie" by Pickering, P had adjusted her clothes.

76. Mr Paddock also gave the evidence set out in his report about the significance of amylase. If the DNA components came from Pickering and the amylase was from saliva, this was readily explicable by P's account. If the DNA components and

amylase did not come from Pickering, the results were not readily explicable by his account of transfer during tickling or giving P a "wedgie".

(f) Our conclusion on the admissibility of the DNA evidence

77. In addition to the general points which we have set out at paragraphs 8 and following, the further point was made on behalf of Pickering that, if all the DNA evidence did was to show that the findings were consistent with P's account and that Pickering could not be excluded, then its relevance was peripheral; it was, however, prejudicial and confusing and should not have been admitted.

78. Unlike the appeals in the other cases, the expert evidence in this appeal did not extend to any evaluative judgment on the likelihood of the DNA having come from Pickering. It went solely to the question of whether or not Pickering was a possible contributor and therefore could not be excluded, a point not in issue in the other two appeals. Thus the contention that there was no statistical evidence or no evaluative evidence in the form of a hierarchy was not relevant.

79. The evidence of Mr Paddock on DNA can be summarised as supporting the proposition that Pickering could not be excluded as the person who had contributed to the DNA; if it was his DNA, then the account given by P was consistent with the results; the results also allowed for the possibility that the DNA was deposited when, on Pickering's account, he gave P a "wedgie".

80. That was relevant evidence and the judge was right in admitting it. It was not peripheral. It appears that what Mr Paddock said was not really disputed. It is regrettable that the evidence could not have been put in a form which the jury could have received as agreed evidence.

(g) The criticism of the judge's questioning during the evidence of Mr Paddock

81. As we have set out, the judge asked numerous questions. Although it was not said that the questions showed any bias, it was submitted that the judge had simply asked too many questions and had descended "into the ring"; that was unfair. There is no merit in the point. The judge intervened only to try and clarify the evidence; he did no more than that. We would only observe that if written materials had been used to explain the basic science that was not and could not have been in issue, the matter could have been dealt with much more swiftly and the judge would not have needed to ask any questions.

(h) The criticism of the summing up

82. It was submitted on behalf of Pickering that the summing up did not explain to the jury the relevance of the DNA evidence.

83. In his summing up, the judge made clear to the jury that the expert evidence in relation to amylase and DNA was only part of the evidence and on its own would not form any basis for convicting Pickering. The presence of amylase was said to be consistent with the presence of human saliva having been transferred to the knickers. Although it was most likely to have been saliva, it could not be said with certainty that it was saliva. The DNA evidence simply showed some components may have

come from Pickering or they may not have done. He could not be excluded as having been a contributor. The judge then reminded them of the evidence given by Mr Paddock in relation to the amylase and the DNA which we have summarised above.

84. In our judgment the judge, as in *Ashley Thomas*, properly put the evidence in context. He explained how it was relevant to the case for the Crown and for Pickering. No complaint can be made.

(i) Our conclusion on overall safety

85. It is clear in our judgment that the presence of amylase in the knickers was strong supportive evidence of P's account; that account was also supported by evidence of contemporary complaint. The DNA evidence was relevant; it was properly admitted and correctly summed up to the jury. The conviction is safe.

(j) The appeal against sentence

86. Pickering appealed against the terms of the Sexual Offences Prevention Order on the basis that its terms were so wide that it excluded him from living with his son without the permission of Social Services. The Crown did not dispute the criticism of the Order and a suitable amendment was agreed in terms which are set out in the Order of the court.

IV: MDS

87. MDS was convicted of murder and other offences which occurred in the course of a robbery by two persons at premises where one person (O) was fatally stabbed and another (L) stabbed. The full circumstances are set out in annex A. For the reasons there set out we have allowed the appeal and will direct a re-trial. The following paragraphs of the judgment therefore deal with the issue on the DNA evidence only. The minimum context needed to explain that evidence is set out. Annex A can only be published after the re-trial.

88. The issue in the case was whether MDS was one of the robbers and, if so, whether he had stabbed L.

(a) The process used for the DNA analysis

89. Swabs were taken from the door bell at the premises. A knife was recovered from a nearby garden wrapped in cling film. Both were sent for forensic analysis by LGC Forensics using the STR process. Many other items were examined but none is relevant.

90. A further and more sensitive analysis called DNA SenCE was carried out by LGC Forensics. The process was intended to enhance the sensitivity by removing the impurities, but, as the Crown's expert, Miss Andrews of LGC Forensics, explained, "there is an increased possibility of seeing DNA components that are not from the sample being tested". This process involved two stages:

i) ScenCE 13 which involved a clean up and concentration step

ii) SenCE 62 which involved increasing the sensitivity at the detection stage

91. The DNA SenCE procedure was repeated twice. The DNA components that were observed more than once were designated as "confirmed" components and used for comparison with reference profiles; only "confirmed" components were used to calculate statistical evaluations of matching components. All components, whether "confirmed" or not, were taken into consideration in the interpretation of the profile.

(b) The evidence of the Crown's expert on the results of the analysis

92. The swabs from the door bell showed a complex mixed profile from 3 or 4 contributors. Components from the DNA of MDS and the other robber were found.

i) It was the view of Miss Andrews that all of the more prominent DNA components matched the profile of the other robber; in her opinion, he contributed a proportion of the DNA

ii) Although in mixed profiles there was an increased risk of finding matching components by chance alone, all of the components of MDS were present in the confirmed and unconfirmed portions of the mixed profile. It was Miss Andrews' opinion that he may also have contributed the DNA samples analysed.

iii) The findings were those she might have expected if MDS had rung the door bell.

93. The knife blade had a weak mixed profile from at least two individuals; the quantity of material was about 200 picograms.

i) All of the components of L's DNA profile were present in the confirmed components. She considered that there was strong support for the view that L was a contributor.

ii) All of the components of the profile of MDS were present in the confirmed and unconfirmed portion of the mixed profile.

iii) After setting out the hierarchy of views, she stated that in order to assess the findings she had considered the following views:

> **"1. MDS has contributed a portion of the DNA the STR profiling result**.
>
> In my opinion if MDS had contributed a portion of DNA then finding 14 out of 20 of his DNA components represented in the confirmed portion of the result along with the remaining 6 of his DNA components represented in the unconfirmed portion of the result is what I might expect.
>
> **2. MDS has not contributed any DNA to the STR profiling result and the matching components observed are due to coincidental matches from another unrelated person or persons.**

> If MDS had not contributed any of the DNA to the sample, then I consider it unlikely that that all of his components would be represented in both the confirmed and unconfirmed portions of the mixed result by chance alone.
>
> I have taken into consideration that some of these matching DNA components also match the corresponding components in the STR profile of L, the unconfirmed nature of some of these components and also the potential number of DNA contributors. It is therefore my opinion that the results provide moderate support for the view that MDS has contributed DNA to this sample rather than the view he has not."

94. The knife handle had a weak mixed profile from at least three individuals:

    i) As all of the components of MDS's DNA were present in the confirmed and unconfirmed portions of the mixed profile, her opinion was that he may have contributed to the DNA sample.

    ii) Some of the components of the profiles of L, O and the other robber were also present, but some were not.

    iii) It was therefore not possible to say if any of those three could have contributed to the mixed profile.

95. The cling film had a weak mixed profile from at least three individuals. Miss Andrews expressed the same view as she had expressed in respect of the knife handle in respect of MDS, L, O and the other robber.

96. The results from each also matched the majority of the profile of another person, SK.

97. Miss Andrews stated that none of these results were capable of statistical evaluation by the conventional method used by LGC. Her experience enabled her to express the views she did. She said others might take a different view.

(c) The evidence for MDS

98. Professor Dan Krane, a Professor at Wright State University, Ohio, USA gave evidence for MDS.

    i) He agreed that MDS may have been a contributor to the DNA found on the knife handle and cling film, but that the corollary of that was that he may not have been.

    ii) As regards the knife blade, he considered there were three contributors in a weak mixed profile. It was not possible to evaluate the weight to be attached to any of the contributors in the absence of a statistical evaluation. DNA was different to other areas of forensic science (such as hair, fibres and shoes prints) where a subjective opinion could be given as DNA analyses were susceptible of statistical calculation. In his view all that could be said was that MDS could not be excluded as a contributor to the DNA on the knife.

(d) The judge's decision to refuse to admit statistical evaluation

99. The Crown sought to call evidence of statistical evaluation from Professor David Balding, Professor of Statistical Genetics at University College, London, who had developed a software programme that the Crown contended could provide a statistical evaluation of the profiles obtained by Miss Andrews.

100. The judge ruled this evidence inadmissible, accepting the submission made on behalf of MDS that the work had not been sufficiently assessed and peer reviewed so that it could be considered to have a sufficient scientific basis to be regarded as part of a body of knowledge and experience recognised as reliable. The judge had little doubt that in due course the validity of his software program would be accepted, but there had not by the time of the trial been sufficient assessment and review.

(e) Challenge to the admissibility of the evidence of Miss Andrews.

101. It was submitted on behalf of MDS that the evidence of Miss Andrews should not be admitted as no statistical evaluation could be given. The judge rejected the submission made on behalf of MDS. He ruled that Miss Andrews' evidence was admissible as, given her experience and expertise, she could give evidence as to the assertion that MDS had been in contact with the knife, leaving the jury to assess the weight in the light of the evidence. That was because evidence of scientific opinion, which was not based on statistical evaluation but based on scientific experience, could be admitted as long as it was fair in all the circumstances for it to be considered by a jury.

(f) The judge's direction to the jury

102. The judge carefully summarised the evidence to the jury. He then told them that the net effect was that the DNA analysis of the cling film, the knife handle and the door bell simply established that MDS was a possible contributor. It might be his DNA. It might not be. The highest the Crown could put it was that the defence could not say that MDS could specifically be excluded. As to the knife blade he pointed out the difference in the views of Miss Andrews and Professor Krane and told them to consider the evidence very carefully.

(g) Our conclusion on the DNA evidence

103. In our view, the judge reached the correct conclusion in relation to the admissibility of the evidence of Miss Andrews. For the reasons we have given at paragraphs 18 and following, there was a sufficiently reliable scientific basis for such evidence to be given. Professor Krane stood firmly by his opinion that evaluative evidence should not be put before the court unless it was firmly based upon statistics. However, for the reasons we have given, we consider that such evidence is admissible.

104. In the result, as is apparent from our summary of the summing-up, the judge left the issue to the jury on the basis that all the DNA evidence did was to show that MDS might have been a contributor. If that was all that the jury were told to rely on, then there can be no doubt that the evidence given was plainly admissible. We do not, however, rest our conclusion on that. As we have said, evaluative evidence is admissible provided that the judge is satisfied that the expert giving that evidence has

a proper basis for giving the evaluative evidence based upon his or her experience and the features of the mixed profile enable this to be done. In this case we are satisfied that was possible and therefore as Miss Andrews did express an evaluative opinion, we consider that was admissible.

105. Nonetheless, for other reasons, as we have explained at paragraph 87, we allow the appeal, quash the conviction and order a re-trial.