



# Science and Technology Select Committee

## Corrected oral evidence: forensic science

Tuesday 30 October 2018

4.25 pm

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Members present: Lord Patel (The Chairman); Lord Borwick; Lord Fox; Lord Griffiths of Fforestfach; Lord Kakkar; Lord Mair; Baroness Manningham-Buller; Baroness Morgan of Huyton; Baroness Neville-Jones; Lord Oxburgh; Lord Renfrew of Kaimsthorn; Lord Thomas of Cwmgiedd; Lord Vallance of Tummel; Baroness Young of Old Scone.

Evidence Session No. 5

Heard in Public

Questions 43 - 53

### Witnesses

Professor Niamh Nic Daéid, Director of Leverhulme Research Centre for Forensic Science, Dundee University; Professor Dame Sue Black, Pro-Vice Chancellor for Engagement, Lancaster University.

### USE OF THE TRANSCRIPT

This is a corrected transcript of evidence taken in public and webcast on [www.parliamentlive.tv](http://www.parliamentlive.tv).

## Examination of witnesses

Professor Niamh Nic Daéid and Professor Dame Sue Black.

**The Chairman:** I welcome Professor Dame Sue Black and Professor Niamh Nic Daéid. Thank you for coming today to give evidence. We have lots of stuff to explore, but, before we start, perhaps you could state for the record your name and any positions that you hold. If you want to make a statement, please feel free to do so.

**Professor Dame Sue Black:** I am pro vice-chancellor at the University of Lancaster and president of the Royal Anthropological Institute, which is the professional body for forensic anthropology in the UK. I am a certified forensic practitioner

**Professor Niamh Nic Daéid:** I work at the University of Dundee and am director of the Leverhulme Research Centre for Forensic Science, which is a 10-year, £10 million-funded research centre. Our core partners are the judiciary and forensic practitioners across the spectrum.

Q43 **The Chairman:** I want to explore with you the scientific evidence base for the use of forensic techniques in the reconstruction of crimes. In your written evidence, Professor Black, you told the Committee that “the scientific evidence base for validity (rather than the use) of forensic science is fragmented”. Evidence sent to us by Forensic Science Northern Ireland spoke of difficulty and fragmentation between, “analytical processes addressing ‘Source’ questions of ‘what and how much?’” and other questions. How can the suggested fragmentation in the evidence base for the validity of forensic science techniques be addressed? How can we improve on this?

**Professor Dame Sue Black:** There is fragmentation; there is no doubting that. We have had a lot of evidence over the past few years to suggest that the basic underpinning of the real science behind what is used in the courtroom has some questionable levels of validity. There are unquestionably some aspects of science that have very sound bases, but there are others where the base underlying science is fragile. There needs first to be a desire to address that problem. As crime changes and different crimes present themselves in court, there may come a day when we no longer need to look for fibres or fingerprints, but that day is not here yet. There is still a requirement on us in the courts to make sure that the evidence that we provide is as sound as possible. To do that requires research to be done.

The question then comes down to: who is responsible for undertaking that research? Do we lay that responsibility at any one door? Are universities meant to do that? If they are, I am afraid that the research councils do not fund forensic science in general, and there is no obvious funding stream for universities to do it. When a university’s research is measured in its research excellence framework, there would need to be a unit of assessment for forensic science in there, but there is not. There is no great drive from the universities in terms of their quality of research to put forensic science at the top of that.

Are the providers responsible for the research? If they are, we have a fragmented framework. In Northern Ireland and Scotland, we still have a national system with a forensic science laboratory, but in England and Wales we have commercial providers. Commercial providers have shareholders; the responsibility there is often to make sure that there is a return on income. So research may be led by very different drivers depending on where we want to place our focus.

**Professor Niamh Nic Daéid:** I agree with what Sue has said, but want to add some other points. If research is to be conducted and driven by the forensic science providers, they need to understand how to do research. I am not convinced that they all do. In my previous academic position, I worked at the University of Strathclyde for many years and was responsible for sending master's students out on placements, many to forensic science providers. The quality of the research in many—not all—cases, particularly in the latter years, was very poor. Our practitioners and those leading the research within the forensic science providers were quite resistant to conversations with academic researchers, who understand the core importance of some aspects around repeatability and reproducibility of experimental data.

Some of the underpinning science for forensic techniques is very strong; for example, in DNA analysis, toxicology or the measurement of drugs. In some forensic evidence types being presented in court, primarily those related to pattern recognition—for example, fingerprints, matching bullets to guns, looking at shoeprints or tool marks—there is not such strength in the validity of those approaches. That has been illustrated fundamentally by work that has come out of the United States, in the National Academy of Sciences report in 2009, in the PCAST report—which you will have heard of—but also in other presentations and publications.

**The Chairman:** What are the greatest research needs in forensic science?

**Professor Dame Sue Black:** That is very difficult to quantify. Forensic science tends to run behind the curve. At the moment, we are trying desperately to cope with the volume of digital information that comes into our police forces, but we need to look beyond that. Research needs to look ahead. At the moment, research is trying to solve the problems of the past rather than necessarily being prepared for the likely problems of the future.

**Professor Niamh Nic Daéid:** Again, I would tend to agree with that. We seem to be almost in crisis mode when trying to predict what is coming next and where we should move our resources around research. Forensic science is poor at looking beyond itself, so we tend to focus as forensic scientists on what is front of us: what drug needs to be analysed, what fingerprint needs to be compared and so on, rather than taking some time out to look at the advances in science going on in the community around us. For example, the advances in DNA technology, nanotechnology, artificial intelligence and machine learning are in large part passing forensic science by, because there is not a strong

opportunity at the moment to engage across those different foundational scientific and research communities.

- Q44 **Lord Kakkar:** What is the culture around forensic science research in terms of publication, peer review and presentation? That is vital to all science and is the foundation which enables us to appreciate developments and determine whether or not they are justifiable and robust. Does that happen in forensic science research? How many people are involved in the UK? How many departments have a robust academic base? How is other material that is introduced for peer review publication assessed and of what quality is it compared to other science?

**Professor Niamh Nic Daéid:** That is a good question. In the UK, a handful of universities have a strong reputation in core research and research publication within forensic science. By that, I mean that they publish more than 10 papers a year. That is a very low number compared with chemistry, physics or other areas of science, whether it is developmental or not. There are some strong publishing research academic institutions around the world. One is the University of Lausanne, which is well regarded for its research track record; the other is the University of Technology Sydney, and there are some in the United States. So there are number of such institutions, but in the UK that number is not very large. There are of course publication mechanisms through peer review, as there are for any other of the sciences or social sciences.

**Baroness Manningham-Buller:** You just said that one problem is that forensic scientists are not very good at looking ahead at what is coming—you mentioned artificial intelligence and some other things. How do you become good at it? What will be the incentive to explore those new areas and their potential? How are we going to galvanise this?

**Professor Niamh Nic Daéid:** One of the ways we do that is by bringing together members of the practitioner community—forensic scientists at the coal face—with our judicial colleagues and scientists outside forensic science who are working at the cutting edge. If it is DNA, they may be at the Francis Crick Institute or elsewhere, wherever the real cutting edge is. We bring them together with others, perhaps creative writers or artists with a different opinion and perspective, to discuss in an honest and open way the challenges that forensic science or science faces in its role in the delivery of justice.

Through those discussions, we generate a research road map that is bought into by the people in that space having those discussions. That allows us to explore the opportunities for collaboration with other institutions which are not normally involved in forensic science research but have a desire to play their part. We speak with people from Oxford, Cambridge, Edinburgh or other universities both here and beyond these shores. It is interesting to note that when they realise the challenges we face as forensic science practitioners, they are incredibly generous with their time and research opportunities. They want to bring their skills and knowledge to bear on our problems. There is no resistance to interaction;

rather, there is the need to provide the opportunities and to be able to articulate where the interaction should happen.

**Baroness Neville-Jones:** I may have misapprehended what you have just said. I do not know how large the forensic science community is, but it does not sound as though it is extremely large. I also do not know whether it is growing or declining. There is an awful lot of relevant activity going on elsewhere in the development of artificial intelligence and in work at the Francis Crick Institute that has forensic application but which is not actually part of the recognised community of forensic science. Do we need to change over time the definition of what forensic science is and who belongs to the forensic science community? How does one deal with the expansion of knowledge in this area?

**Professor Dame Sue Black:** The honest truth is that we have stymied ourselves with the lexicon. Forensic science is science in the courtroom, and the most important thing in that is the science. Over time the forensic science community has become so siloed and inward-looking that the advances have almost become minimal. When you tear down the walls of the silo and you engage with the rest of the scientific community out there, the forensic element is a bit like a magpie. It chooses all the shiny bits that it can use and reassigns them to the problems being faced by either the investigative forces or the courtroom. We have not done enough of that, but we are starting to do so. If there is a hope for science in the courtroom, it will be by engaging the wider scientific community and saying, "Not only is the science you are doing applicable in your area, it can be applied in different areas". The last report by Professor Sir Mark Walport before he ceased to be the Chief Scientific Adviser looked at the flexibility, agility and fluidity that forensic science can have if it chooses to move in that direction.

Q45 **Baroness Manningham-Buller:** I will now have to rephrase the question and not talk about forensic science. One of the questions we put to the previous panel was about the level of education of those operating in the courtroom—the judges, prosecutors and defenders. Do they understand the value or otherwise of science? I think that we are working on the assumption that more education is needed. Am I right in that and if so, what is the best way of delivering it, bearing in mind, as we also heard, that people are very busy? There seemed to be a reluctance on the part of the previous witnesses for compulsory education.

**Professor Dame Sue Black:** We were very fortunate a few years ago. Most of the time, the only interaction between a scientist and a lawyer is when the scientist is in the witness box. That is an incredibly scary place for a scientist to be. We took an even scarier step by meeting the Lord Chief Justice of England and Wales. At that point we began to realise that we are ourselves siloed within the disciplines. We also did not realise how much the judiciary does or does not know about our science or how much is in the folklore of forensic science. That is the absolute bane of television series and crime writers. We started to realise that part of the problem and part of the solution is about exactly what is happening here—communication across the piece. You do not know what you do not

know at any specific point in time because you do not know it. A huge amount needs to be done on communicating what science is capable of doing but also what it is not capable of doing. The primers we heard about earlier are the start of that process. It is about being able to state independently and in an unbiased forum what we know about the science and what we do not know about it. We need a much more honest discussion.

**Professor Niamh Nic Daéid:** I completely endorse that. The “we” that has been talked about is us. The conversations that we have been fortunate to have with our judicial colleagues allow two forensic scientists to be able to speak honestly and openly with very senior judges in Scotland, England and Wales, and now also in Northern Ireland. Collaboratively and collectively, we have been able to explore together the boundaries of what we know and what we do not know.

**Baroness Manningham-Buller:** You mentioned the University of Lausanne and some of the work that the American academies have done on this, which we heard about in evidence given last week. Do you think that other countries are better at the intersection between the judiciary and the science?

**Professor Dame Sue Black:** No, I think that we are leading in this area. That is the honest reality. When we talked to members of the senior judiciary in Australia, they were quite taken by the fact that there was a benefit to be had from the legal side and the scientific side talking to each other. In one of the strategic conversations we held, the Americans said that it would never happen in America. At no point will judges sit around a table and talk to scientists.

**Professor Niamh Nic Daéid:** I have just come back from the National Academy of Sciences; I was there about two weeks ago with colleagues from the Royal Society. We presented the primers as a success story of collaboration between the senior judiciary and scientists. In the Royal Society’s science and law lecture series, it was reiterated that it is incredibly difficult for this to happen in the United States. I agree completely that the UK is in the lead position.

**Baroness Morgan of Huyton:** The primers seem to be one of the most positive things we have heard about. However, it sounds as though it is not a fully-fledged project. It seems to be good as far as it goes, with two areas having been covered so far. Is there a commitment to a continuing process? DNA and other areas of science will not stop. Is there a long-term commitment to the dialogue and producing a bank of material from which all parts of the legal system will be able to draw in the future?

**Professor Dame Sue Black:** We started with two because we had to figure out how it would be done. We chose areas at different ends of the spectrum and we found that it could be done. Three more are in planning at the moment, but those are being driven by the Royal Society and the Royal Society of Edinburgh. They are bankrolling them. There will be a point at which an evaluation will need to be made asking whether it is really making any difference. If it is, I think that the model needs to be changed.

**Baroness Morgan of Huyton:** In a sense it has to be part of the justice system. If it is about saying how forensic science works as part of the justice system, that then has to be integrated.

**Professor Dame Sue Black:** This is technically a pilot, if you like, between the Royal Society and the Royal Society of Edinburgh, but there is a commitment to continue with it.

Q46 **Lord Kakkar:** What proportion of the methodology of forensic science being used in the courts would you say has been properly peer reviewed to a robust level where you feel entirely comfortable about the science and that the experts being presented with it can use it with absolute confidence?

**Professor Niamh Nic Daéid:** That is a difficult question to answer. I shall go back to the statement I made earlier. There are some areas that forensic science uses, such as toxicological examinations and drug testing, that take the foundational science—how good is a machine at measuring a particular thing?—from developments in analytical chemistry, from developments in what we understand about genetics and so on. The science is robust but that robustness has been generated outside of the forensic application. In those circumstances, the DNA primer is a good example of articulating that. The science underpinning the techniques being presented is well understood and has been validated not just across the forensic science community but more broadly. That gives us confidence and comfort that while it is still expanding as a scientific area, it has reached a level of robustness scientifically. I hope that helps.

**Lord Kakkar:** That does help, but it represents only a part of what will routinely be presented in criminal cases. How can we be reassured about the other part, where the broader science base underpinning conclusions and methodologies is not so well established? How does the forensic science community ensure that that is well understood in terms of the use of the material?

**Professor Dame Sue Black:** The judicial primers are one way.

**Lord Kakkar:** They are quite limited.

**Professor Dame Sue Black:** Yes, they are limited, but they have been a way to show the honesty about the science. We need to have honesty about the other sciences. The PCAST report in America which was produced by President Obama's advisory council said that bite mark analysis, for example, was no longer going to enter the courtroom because there is so little scientific testing and association of how a bite mark can be related to an actual mouth. Most of it is probably very dangerous ground. There are many like that, but they are niche sciences, and that is what is important. They do not often arise in volume crime, they are to be found in niche crimes.

**Lord Kakkar:** Do we have a mechanism in our own criminal justice system to identify those niche areas and for experts to be able to communicate that in terms of the prosecution of the trial.

**Professor Niamh Nic Daéid:** Many forensic practitioners know the limitations of what the techniques that we use can deliver. The mechanism for providing the courts with an opportunity to test them is through the evaluation and interpretation of the evidence being presented within the context of the case. For that to occur effectively and efficiently, we need background information on, if not bite marks, something like fibres. We need to understand what the transfer of materials looks like: how easy is it for materials to transfer from one place to another given a particular set of circumstances, how long those materials persist for and what is the background abundance of materials? All of those elements allow us to evaluate a particular piece of evidence in an effective way within the context of a case. Those different elements are not widely understood for many of the evidence types that are presented in court.

**Lord Vallance of Tummel:** I go back to judicial primers and training. These seem to be catch-up exercises. Is there any virtue in having them instilled in the courses that barristers have to undertake so that they cease to be a catch-up? They would have to learn about and understand forensic science just to do the job.

**Professor Niamh Nic Daéid:** That is a valid point. There is a fundamental lack, in my understanding at least, in the level of scientific training and training in numeracy that is presented to law students. In a similar way, I would suggest that a fairly poor understanding of the law is presented to forensic science students. Those two things need to be balanced because as forensic practitioners, when we go into court for the first time, for many of us it will be the very first time. An understanding of the rules that we as expert witnesses are expected to adhere to is very important. In my experience, many forensic scientists are also not particularly good at numbers. There are some core things that forensic scientists need. They must be good scientists, good problem solvers and numerate. They need to understand a bit about the law and their role in it, and they need to be excellent science communicators.

**Baroness Neville-Jones:** That is quite a high order of obligation and talent. Who is taking part in the process that the Royal Society is promoting and funding? Are there people from all areas of the judicial system? Is the Bench, the Bar, the CPS and the police? Is everyone who should be involved going to be taking part?

**Professor Dame Sue Black:** There is a steering committee that was led by Lord Hughes and now by Lady Justice Anne Rafferty. Its job is to decide what the next primer is going to be. At that point, a lead person is identified for the primer who fundamentally will bring it together. There is a writing group which is taken from high-level scientists and the judiciary to make sure that the match is correct. Beyond the writing group is an editorial group that oversees everything. Once the primer is written, it goes out to peer review, which means that it goes out to 20 judges, 20 scientists and 20 forensic practitioners. It is a communication that will be peer reviewed more than any other paper would be before publication. It will have gone through the judicial level, the science level and the forensic practice level.

**Baroness Neville-Jones:** It is not just a discussion.

**Professor Dame Sue Black:** No, it will be peer reviewed.

**Professor Niamh Nic Daéid:** The final process is to have it signed off and ratified by the councils of both the Royal Society and the Royal Society of Edinburgh.

**Baroness Neville-Jones:** When does the process finish?

**Professor Dame Sue Black:** Technically, there will never be an end to it, other than death. We have done two and three more are coming along.

**Professor Niamh Nic Daéid:** There is a long list. That is the point.

**Lord Kakkar:** I am returning to the second question about funding. How would the argument be made to justify more research funding for forensic science? In that regard we have heard something already about the particular focus. How could or should UKRI, bearing in mind its leadership under Professor Sir Mark Walport, be engaged in terms of specifically addressing this area? We have heard that there is no particular REF group for forensic science and therefore no real incentive for universities to pursue this at the moment.

**Professor Niamh Nic Daéid:** The opportunity for embedding forensic science into funding proposals is one of interdisciplinarity. I am sure that you will have heard that already. Sir Mark has said publicly that one of the pushers that UKRI is going to have is on interdisciplinarity. Breaking down of the silos is needed not just in the area of forensic science but across the piece. It will help the UK to develop its core leadership. I have sat on a number of panels that judge EPSRC grant proposals. They select which proposals will be put forward for funding. The science that is presented in the proposals is very exciting, world-leading and ground-breaking, but almost all of it could have an application in forensic science. Part of how we engage with UKRI as an applied scientific community is by reaching out to our fellow scientists, social scientists and those who work in the humanities—and working in partnership with them to say, “Here is an application that could be part of the impact of the particular foundational science that is being developed”.

**Lord Kakkar:** How is that going to be stimulated? Should there be—through UKRI, for instance—a call for such multidisciplinary proposals focused on the forensic science applications of broader science? How do you propose making that happen and how should UKRI assist in it?

**Professor Dame Sue Black:** We have had calls in the past that have been based around forensic science. When you make the call about forensic science, it tends to draw out of the woodwork all the historical projects from the past; they tend not to be focused on the future. The way to do it is to say: when we have such incredible leading and cutting-edge science, can we look at the application of it? So in the application process for the main scientific proposal, it is a question of how it can be applied. Forensic science can fit across absolutely any aspect of science.

**Lord Kakkar:** That would mean adding a specific box to the call. Let me

try to simplify this: "What is the forensic science application of your proposed methodology or approach?"

**Professor Dame Sue Black:** It could well be.

**Professor Niamh Nic Daéid:** That is the approach that the REF is beginning to articulate. Although forensic science does not have a unit of assessment in REF, it is the only flagged topic in the interdisciplinary category for REF. The REF statistics should reflect, at least in part, the level of interdisciplinary science which is going on that has that forensic science focus. We need to grow our impact in REF organically. We need to do that in a way in which we can demonstrate impact, rather than go straight into a REF unit of assessment.

Q47 **Lord Thomas of Cwmgiedd:** I had better make a disclosure statement. It is particularly important that I do so in relation to these two witnesses. As an appellate judge over the years, I have given judgments in a number of forensic science cases which have unearthed many of these problems. There are related problems which have arisen in medical science cases where in the end the issues are probably similar. I was also a member of and the chairman of the Criminal Procedure Rule Committee when a lot of the procedural changes were made to improve expert evidence. I started dealing with the regulation of that when we had something called the Council for the Registration of Forensic Practitioners—it failed because it ran out of money—right through to what is currently being done with the Royal Society, with the Home Office in between. I know some of our witnesses, including the two witnesses before us, reasonably well. That was a long preamble.

You have mentioned Australia and the United States, and you briefly mentioned Lausanne. I think that the Netherlands are quite advanced. Could you describe, by reference to Lausanne and possibly fingerprints, the kind of work that would illustrate why it is so important to have science behind what has traditionally been thought of as an important aspect of forensic technique?

**Professor Niamh Nic Daéid:** Some really cutting-edge work is being done at the University of Lausanne trying to understand from a probabilistic perspective the means by which fingerprints can be compared with each other. You will have heard of the ACE-V process which is currently used in many countries around the world for comparing fingerprints. Our colleagues at the University of Lausanne, in particular Professor Champod, have been working on trying to set more of an objective measurement for this comparative process.

**Lord Thomas of Cwmgiedd:** What sort of contribution has been made by people in the Netherlands?

**Professor Niamh Nic Daéid:** The Netherlands model is quite interesting. The Netherlands Forensic Institute is, I believe, the only or the major provider of forensic science in that country. The Netherlands Forensic Institute has worked in partnership with local academic centres. Some of its lead scientists are also professors and academicians within

the universities. That allows them to bring practice into the research focus. Lausanne has a similar model. In our centre we look to bringing in Leverhulme Fellows in a similar model. We bring practitioners into the space that researchers inhabit. It works very well because it means that the research that has been undertaken is actually focused on the issues. The difference in our approach is that we work very much with our judicial colleagues rather than just with the scientists.

**Professor Dame Sue Black:** Of course, the Netherlands has an inquisitorial approach, whereas we have an adversarial one. The forensic science is dealt with in a very different way in terms of the experts.

**Lord Thomas of Cwmgiedd:** As would happen in Lausanne. I have to be careful not to give evidence myself. The other question I wanted to ask you is that not only given the experience you have had in Scotland but also dealing with the judiciary and forensic service in Northern Ireland, what are the principal benefits of the English and Welsh system as opposed to the systems in Scotland and Northern Ireland, which have retained their forensic services? Further, what are the disadvantages?

**The Chairman:** The answer cannot be none.

**Professor Dame Sue Black:** When the Leverhulme grant was being put forward, we felt at the time that there were only two places that the work we wanted to do could be carried out: Scotland or Northern Ireland. What we had were single points of contact. We were able to work with a single police force, a single set of judiciary and a single forensic science laboratory. That actually gives you the opportunity to have a much tighter team. If we did it in England and Wales, we would be dealing with 40 police forces and 10 or 15 providers. It simply could not be done. What we wanted to do in terms of breaking the silos required coherence.

There are parts that work much better in England and Wales. I will be shot for saying that when I go across the border. Bringing expert witnesses together to agree on the evidence before going to court works incredibly well. That does not happen in Scotland. The experts are kept separate. In the courtroom, the expert witnesses are not present during the trial. They come in only to give their piece of evidence and then they leave. At no point can they assist the legal teams with things that may come up in the other evidence. There are good things on both sides.

**Baroness Morgan of Huyton:** You have just said that in England the expert witnesses are put together and that works well. That is not mandatory, is it?

**Professor Dame Sue Black:** No, it is not.

**Baroness Morgan of Huyton:** Should it be?

**Professor Dame Sue Black:** It is enormously helpful because it cuts down on a huge amount of time in court. Often you are trying the science and you are trying the witness, whereas in fact what we should be questioning are the differences in opinion. I do not think that I can say whether it should be mandatory, but it certainly helps. We did have a case in Scotland involving a post-mortem where we had both the defence

and the prosecution together. It worked incredibly well, but no matter how well it worked, we were told that the experts needed to be kept separate.

**Professor Niamh Nic Daéid:** It works very well in civil cases. It has been used in Australia in what you might have heard being referred to as hot-tubbing. They bring the experts together in criminal cases. I do not think that they actually do it in a hot tub.

**Baroness Young of Old Scone:** This goes back to the research agenda. You talked earlier about research road maps. Is there a need for some sort of process to examine across the piece where the major gaps are and what the priorities ought to be, or is that already happening with the primers? Perhaps we need to take the primer work one stage further. You might then commission work rather than leave it to individual researchers to submit research grant applications related to their field of interest.

**Professor Dame Sue Black:** Absolutely, but you also have to look at who is asking the question and who is directing the research. If the research is being directed and led by the police, that will develop a certain line of research investigation. If it is being led by scientists, it will be a different line; equally, if it is being led by the judiciary, that too will be a different line. There needs to be common agreement.

**Baroness Young of Old Scone:** And if we locked you all in a room, could that be resolved?

**Professor Dame Sue Black:** If you threw away the key and came back 50 years later, perhaps. In all seriousness, communication is important. As you heard from the previous panel, the courts do not normally speak to the scientists. That was our big problem. As scientists, our interlocutors have always been the police. They speak to the judiciary and to scientists, but scientists rarely speak to the judiciary. Opening that up gives us our best hope for and best chance of finding the right way forward, not being driven by only scientists or only the police, across the needs of the entire legal system.

**Professor Niamh Nic Daéid:** That was one of the key points of the Leverhulme funding that we achieved. The Leverhulme Trust wanted to fund centres for disruptive research. That research needed to disrupt an ecosystem. The research work that we carry out is not focused on a single research question. The research questions are co-created by the individuals that we bring together in a creative space—we do not quite lock them in a room, but we almost do—so that they have an opportunity to deal with a particular topic and discuss it openly.

Our strategic conversations are not focused on chalk and talk but on sitting together and working out solutions, which develops our road map. In each of these conversations, a graphic artist works with us to draw the conversation so that we end up with a drawn set of minutes where the road map is articulated through imagery. We can then take those elements of the road map and disseminate them much more widely than we can do in our research centre. They form the basis of the beginnings of conversations with other academics, practitioners, industry

entrepreneurs and innovators that say, "Here is a set of challenges that the entire ecosystem has presented to us. How do we, as a broader community, sit down and try to work them out and find solutions? Where do we need to go for further funding? Who can we ask to look at developing new economic products or innovative solutions for different areas in digital evidence, for example?"

**Lord Vallance of Tummel:** You mentioned earlier the advantages of a voluntary agreement, at least for the time being, between expert witnesses in advance. We learned from other witnesses that this does not sit comfortably with an adversarial form of justice. Is there any advantage in having some kind of formal protocol for the sharing of forensic evidence, possibly in terms of the presentation of that evidence, which needs to be objective rather than—how should I put it—adversarial?

**Professor Dame Sue Black:** Forensic science should be impartial. Nothing should prevent there being a common ground because at the end of the day, everybody is trying to get as close as possible to the truth. I do not see any reason why there cannot be common ground in terms of what the experts agree on, how it is done and how it is presented. You have that more in England and Wales than anywhere else. It gives you the opportunity to find the points of agreement. The points of disagreement are usually much smaller and will often fall away. It takes away some of the theatre in the courtroom with an adversarial system if we already have points that are agreed.

**Lord Vallance of Tummel:** That could be put into a formal protocol?

**Professor Dame Sue Black:** Yes, it could.

**Lord Vallance of Tummel:** Thank you.

Q48 **Lord Mair:** In the earlier session, which I think you were both present for, we discussed at some length whether the market is achieving sufficient excellence in forensic science, with the difficulty of going for the cheapest price, the issue of competition, and how it may be that the successful bidder does not have the right level of seniority—and, worse still, may go out of business. Can you comment on the market? Is it sustainable?

**Professor Dame Sue Black:** I assume you are talking about the market in England and Wales, because of course the market is different in Scotland and Northern Ireland. Is it sustainable in England and Wales? It has to be. We have to be able to sustain that market because it serves justice. If it does not work, we have to find a way to make sure that it does. It is fragile; you have heard that word because we are dealing with a commercial market where, at the time, a lot more funding was available than there is currently in the police budget. There have been huge constraints on the finances available. It is a highly competitive market, so you make bids that come in beyond the price that you can sustain; that means that companies are in danger. When companies are in danger of failing, justice is in danger of failing. Something has to be

done and we have to make sure that it works. At the moment, we are getting signals and warnings that this is not ideal.

**Lord Mair:** What changes should be made?

**Professor Dame Sue Black:** We need a market that is sustainable but if our model is to have more than one player in the commercial market, such as in Scotland and Northern Ireland, we must have equity across the prices. It cannot be a price war because justice pays for that war. We need commonality on costs. We need to ensure that each and every one of them meets the standards that we require, but we must be careful about standards, whether we are talking about ISO accreditation or otherwise. They are very expensive. You may find that in enforcing ISO accreditation or other forms of accreditation, you will lose players from the market because they simply cannot afford it. You will lose niche providers because they cannot meet the costs of ISO accreditation. It is not a simple market at all; it is very complex.

**Lord Mair:** If you have several niche providers that meet the ISO accreditation, how should they be selected, given that there is a need to define the appropriate provider for a particular case? Are you saying that it should not be based on price?

**Professor Dame Sue Black:** Price drives the market. If we want the market to be commercial, finance will drive it. If you can remove the financial element, so a company knows that test A will cost that much whichever provider you go to, companies can develop their own model for whether they can meet those needs. I suspect that some companies will be able to offer some services but some will not. It is up to local police to determine the companies in that geographic region or capability that they can go to, knowing that if they need that service, they will get it—not what we were hearing earlier about phoning around trying to find somebody to do it—and they can meet their needs. Knowing the cost means that it can be built into the budget. Finding the niche providers is really difficult. Find an expert in knots, for example; there is one in the UK. How do you accredit that one person? It might be incredibly important to the case that you hear in court that day. There is a spectrum to be considered.

**Professor Niamh Nic Daéid:** I would add that an uneven playing field has been created. One of the pieces of written evidence said that, of the £300 million being spent on forensic science by the police, 80% is now spent in-force, meaning that only 20% is supporting the external forensic provider marketplace. As you will be aware, there are differences between whether external forensic science providers and internal, in-force forensic science providers are accredited to ISO standards. As Sue said, for small businesses providing niche services, accreditation is very expensive. Should that accreditation have to be undertaken by those individuals? There needs to be a balance across the whole sector to determine how we can deliver the very best quality of science that can be delivered into the criminal justice system without removing some of the smaller, niche players—or indeed the academic sector, which also provides evidence to the courts.

**Lord Mair:** Is the accreditation about the technique or the people?

**Professor Dame Sue Black:** There is accreditation for the technique and the actual mechanism of producing the answer out of a piece of equipment. There is also accreditation for individuals, so it is about both.

Q49 **Baroness Neville-Jones:** Two points, very briefly, on the funding of the system. You heard the very transactional situation that was described in the previous session; do you think that long-term contracts which do not price individual pieces of work but for which accredited providers have a long-term relationship for an agreed fee would help? At the end of the previous session, we heard that there just has to be more money in the system. It is all being run on a shoestring, in effect, and we cannot go on like this without there being a really major crisis. Do you agree with that assessment?

**Professor Dame Sue Black:** Long-term contracts can do one of two things—and probably both. They can give a company a degree of assurance; there is a longevity in the relationship with that police force and, therefore, that allows for greater planning. But that also runs the risk of laziness and of saying, “I’ve got the contract, I don’t need to worry”. Signing the contract is useful, but monitoring, maintaining and reviewing it is extremely important to keep everybody sharp.

**Baroness Neville-Jones:** With that proviso, would that improve the situation or not?

**Professor Dame Sue Black:** I think that it could.

**Professor Niamh Nic Daéid:** I would agree with that. The checking and the review are really important. Technology develops and you need to ensure that the right technology is being implemented. Also, long-term contracts allow for the building of strong relationships within the whole investigative process. It would also ensure that the forensic science provider can invest in the development of its staff. The corporate memory within the forensic science domain of what has gone before, what works and what does not is being lost quite considerably from the system—where people know what research has been done, have time to review that research and read the papers and so on. With a long-term contract, you have a little bit more time to invest in training your staff so that they can keep up to date with what is going on around the world, not just in the UK.

**Baroness Neville-Jones:** Is there enough money in the system?

**Professor Dame Sue Black:** That is the really difficult one. The easy answer is always to say that we need more money. Forensic science has never had much money. We were brought up in the era of “Blue Peter” and “Dad’s Army”—we can make anything out of sticky-back plastic, and we do. So forensic science has survived being underfunded while serving its purpose for a long time. Of course, it is always going to want more money, but my advice is that, if there is money to place, it needs to be placed carefully. We need to look at where we can get the best returns. The minute that there is money offered, you will get a cacophony of

individuals telling you the most important thing to place that money into. If there is funding, it will be as rare as hen's teeth and so we need to make sure that it hits the right place.

**Professor Niamh Nic Daéid:** Just to back that up, what you will have read and heard in your evidence is that we do not really know a lot about transfer persistence, background abundance—whatever that stuff might be. We are not very good at recognising patterns or distinguishing between them. We are using algorithms now to unmix DNA profiles, but they are all behind closed doors and in black boxes. The funding that is made available—if it is made available and I absolutely endorse what Sue has said—needs to unlock these areas, because they have been locked up for the past 100 years. The energy needs to be put into creating open-source data and open-source algorithms that our court systems can have confidence in and that are available and accessible to everybody, whether they work for the prosecution, the defence or the academic community.

**Baroness Morgan of Huyton:** After listening to you earlier when you were talking about primers, my question is: is investment in primers, for example—or anything else that is systemic like that—possibly a better place to put the money rather than just saying, “We need more money going into new bits of research in the sciences”?

**Professor Niamh Nic Daéid:** The forensic science community knows that it needs to understand better what its piece of evidence might mean in the context of a given case. I reiterate what I have I just said: a lot of it is about understanding just how things transfer and how they persist when they do so, whether we are talking about DNA, fibres, explosives, drugs or anything else, and what background residue exists in our homes and communities. We do not know that. Without that knowledge, employing probabilistic statistics to try to give a reasoned answer when we are asked that question in court is incredibly challenging. There is also making use of new and innovative technologies and emerging methodologies such as machine learning to see whether that is applicable into our space. It may very well be.

**Professor Dame Sue Black:** But it must not be allowed to fall into the abyss of, “Oh, here's something shiny. It's artificial intelligence. Let's use it”. We need to say, “No, do the background science. Make sure that there is veracity, accuracy and reliability in in there”. We need to learn from the mistakes of the past.

**Professor Niamh Nic Daéid:** Similarly, DNA analysis used to be an emerging area in molecular genetics. It was at the cutting edge 34 years ago when it was introduced into the criminal justice system. The areas that we look at in DNA profiles are still those that we looked at 34 years ago, with some notable exceptions.

Q50 **Lord Mair:** As a result of what we have been hearing, do you think that, if money were no object, it would be better to return to a national forensic science service?

**Professor Dame Sue Black:** Not necessarily. There is a risk of rose-tinted glasses when looking back to something that has been. There were

problems with the Forensic Science Service. Some excellent work came out of it, but I am not sure whether returning to it is the right or wrong answer. It is a possibility, but if we do not return to it, something has to be done about our current market.

- Q51 **Lord Renfrew of Kaimsthorn:** I would like to go back to the role and status of the Forensic Science Regulator. The forensic science strategy suggested that the regulator should have statutory powers, but the Government have not done very much about it; it was left to a Private Member's Bill, which is apparently not to get anywhere in this Parliament. One of our witnesses in the previous session, Abigail Bright, seemed rather to shrug her shoulders and say that it did not make much difference whether it had statutory powers or not.

On the other hand, we have heard from the regulator that without statutory powers they cannot guarantee high standards. I would have thought that it should be an important role, but there seems to be a great disparity of views and activity in this field. What do you feel about that?

**Professor Dame Sue Black:** The issue of statutory powers has been rolling along for as long as I can remember there being a regulator. There seems to be no urgency coming out of this, which I do not understand. If the role of the regulator is to advise, they do not need statutory powers. But if it is to enforce, my goodness me yes they do. It is whatever the job title is; if it is to advise, then no, but if it is to mandate—

**Lord Renfrew of Kaimsthorn:** If I may interrupt, that is not a view. We are asking for your opinion, and you are saying that it could be one thing or another. What is your opinion?

**Professor Dame Sue Black:** Not knowing what is in the forensic regulator's job description, I would say that if her job description simply says "advice", I do not believe that statutory powers are necessary.

**Lord Renfrew of Kaimsthorn:** So what should her job description be?

**Professor Dame Sue Black:** I have not read her job description, but I believe very firmly that her job is not just to advise; it is to mandate and to ensure that we meet the standards that are required. She holds that in England and Wales; she does not hold it in Scotland or Northern Ireland. There, she advises, so she does not have the mandate there and would not have it.

There would have to be an agreement that either the Forensic Science Regulator covered the entirety of the UK or she had a different responsibility in England and Wales than she has in Scotland or Northern Ireland, which I do not think is a good idea. I believe very firmly in being in a United Kingdom camp, that we should have the same standards right the way across and that they should be as high as we can achieve. If, in order to achieve those standards, we need the regulator to mandate, that is what we should do.

**The Chairman:** I see you nodding, Professor Nic Daéid. So you both

agree on that.

**Professor Niamh Nic Daéid:** I am nodding, because I agree with what Sue has just said.

Q52 **The Chairman:** Do we have the capacity in the criminal justice system, and is enough research being done to deal with the increasing demand generated from digital forensics? Short answers, please.

**Professor Niamh Nic Daéid:** No.

**Professor Dame Sue Black:** It is absolutely huge. I work in the area of identification of individuals responsible for child sexual abuse, and the volume of material that comes across police desks is such that they cannot arrest their way out of it. They simply cannot. The volume is huge, and more needs to be done.

**Professor Niamh Nic Daéid:** Our last strategic conversation at the Leverhulme Centre was on digital evidence. We brought in practitioners from around the world, including colleagues from Police Scotland. What emerged from that conversation, which the police are now calling a national conversation, was the vast amount of work that needed to be done and the fact that it needed to be done in concert with each other, by which I mean everybody from the crime scene side right the way through to the courtroom. There is a huge job to be done here, but we need to start by understanding each other's perspective, having a common language and then rolling up our sleeves and getting on with it.

**The Chairman:** Thank you both very much for coming today. We appreciate your evidence. There was lots of information. Nice to see you both.

**Professor Dame Sue Black:** Thank you. We appreciate it.

**Professor Niamh Nic Daéid:** Thank you.