SCIENTIFIC EVIDENCE AND THE LAW

By Professor R. C. Nairn

Delivered at a Meeting of the Medico-Legal Society held on 13th October, 1984 at 8.30 p.m. at the Royal Australasian College of Surgeons, Spring Street, Melbourne. The Chairman of the Meeting was the President, the Hon. Mr. Justice Fullagar.

Scientific evidence in the judicial process is the oldest example of communication between two different disciplines, and it is the most well known and probably the most abused. It began as "medical jurisprudence" early in the 19th century, but this would not be called science as we understand it today.

Sir Roger Ormrod in an address to the British Royal College of Pathologists in 1982, cites an example in 1857, of whether blood on the prisoner's knife was human, or as the prisoner contended, from cutting raw beef. A so-called "professional analyst" gave evidence that the blood was not that of an ox or sheep or pig. He based his opinion on the relative sizes of what he called the "globules of blood" in man and the other animals mentioned—Man = $\frac{1}{3400}$ of an inch (= 7.47 mu cf 7.20 today). Ox = $\frac{1}{5300}$ of an inch. The judge commented on the "marvellous powers of the modern microscope" but then warned the jury to ignore such scientific niceties. The man was still convicted, but on other grounds.

It is within the memory of many of us here that lawyers were saying the same thing about blood groups in paternity cases. Yet the medico-legal application of human blood grouping has more than 60 years of history. Reuben Ottenberg, a physician at Mount Sinai Hospital, New York, published a series of 3 classic papers on "Medico-legal Application of Human Blood Grouping" in the Journal of the American Medical Association in 1921 and 1922. The papers were such classics that they were reprinted in the November 11, 1983 issue of the J.A.M.A. as "Landmark Articles" and that is how they came to my notice.

I will read an extract from the Summary of the third paper:

Because of the possibility of laboratory error, "the following precautions must be observed: (a) Every test must be done in duplicate using different sets of test serums. (b) Test serums must be shown to be active at the time of the tests. (c) Where there is possibility of doubt, both serum and cells of the individual must be tested".

He then goes on to mention in his final sentence that another famous medical scientist, J. A. Buchanan, disagrees with him and all

other authors that blood groups are inherited. History has shown that Buchanan was wrong, but one can well picture the court cases in the 1920s, in which he appeared for defendants in paternity cases.

This thought about duels between scientists in court since the beginning of medical jurisprudence and scientific legal evidence brings me to reflect on the so-called differences between science and law.

Scientific enquiry and information is generally thought of by the lay public as objective, unemotional, accurate and incontrovertible. That things may be scientifically proven to reveal one absolute truth.

Legal enquiry on the other hand is in our community and others like it, generally known to be adversarial. A duel between lawyers in the pursuit of victory and not necessarily truth or even justice.

These views comparing scientific and legal enquiry are of course over-simplistic. One has only to read accounts of the duels in court between the archetypes of forensic scientists—Bernard Spilsbury and Sydney Smith, both of whom I knew personally—to appreciate their adversarial approach to the delivery of scientific evidence. Spilsbury was an arrogant dogmatic man who could never give to a lawyer's question, the answer "I don't know", and late in his career lost the Crown many cases for that very reason. Smith was a giant of a man both physically and intellectually, and of the two was much the better scientist in the real sense of the word.

Equally, on the other side of the coin, it is naive to believe that the histrionic ability of lawyers is going to shake real evidence into a wrong verdict.

However, when we have both the defence and prosecution scientists and lawyers jousting in court we must expect real problems and danger of miscarriage of justice. I cannot proceed with that particular theme without alluding to the Chamberlain trial in Darwin in October, 1982.

A brief resume of that case is that Mrs Chamberlain was charged with murder of her 9½ week old baby daughter, allegedly committed on 17 August, 1980 at a camp site at Ayers Rock.

At the first coronial inquest in December, 1980, at Alice Springs, the Chamberlains were exonerated of all blame and the baby's disappearance and death were attributed to a dingo taking the baby.

At the second coronial inquiry a year later in December, 1981, again at Alice Springs, with a different Coroner, the Crown brought forward evidence that old dried blood stains allegedly from a baby had been identified in the Chamberlains' car, and other evidence to suggest human intervention from examination of the baby's clothes which had been found in a rocky clearing not far from the camp site. At this inquest, the Chamberlains were committed for trial in Dar-

win, and in October 1982, Mrs Chamberlain was found guilty of murder and Mr Chamberlain of being an accessory after the fact.

The interest of this trial for my communication tonight on Scientific Evidence and the Law, is that I was engaged by the Defence in July 1982 to review the scientific evidence in the case and eventually to appear as an expert scientific witness for the Defence. Because I read all relevant transcripts from the inquest and during the trial and had access to all exhibits available to the Defence, I had much more information than was available after the trial to later analysts.

My reaction to the evidence about a baby's blood stains in the Chamberlains' car was one of incredulity that such skimpy evidence from misapplied inadequate immunological tests by the Forensic Laboratory in N.S.W. could sway a Court in a murder case, when we recall the Judiciary's one time reluctance even to accept evidence from fresh blood analysis by expert laboratories in paternity cases.

To explain what tests were done to identify baby blood, you need to know that at birth a baby has two kinds of haemoglobin, the red blood pigment responsible for carrying oxygen from the lungs to the rest of the body. The two kinds are—fetal haemoglobin—about 70% at birth, and adult haemoglobin—30%. The fetal haemoglobin has its special value in the mother's womb, because it competes for oxygen better than adult. After birth, the proportion of adult haemoglobin rises and by 9½ weeks, the age of the Chamberlain baby when she disappeared, the proportions were as expected 25% fetal and 75% adult. This was established from subsequent examination of the baby's blood-stained clothes in the Forensic Laboratory, South Australia.

Now it is possible to buy antisera, made by immunizing animals with purified preparations of new born blood from the placenta—antisera that will react with fetal and adult haemoglobin. The antisera can be specially treated to react only with one or the other. These simple immunological facts did not appear to be understood by the forensic science witnesses for the Prosecution. The evidence given by them was that the antiserum purchased by them as anti-fetal haemoglobin had reacted with some samples of dried blood tested and thus proved there was baby blood in the car and on some objects taken from the car.

That baby Chamberlain, like any other baby of that age, had 75% adult haemoglobin was ignored.

The tests were made by inexperienced staff and without the stringent precautions for blood tests that I mentioned at the beginning of this talk, as set down by Reuben Ottenberg in his classic papers on "Medico-legal Application of Human Blood Grouping". Tests were

not done in duplicate and the test antiserum was accepted as purchased and not examined in the laboratory for specificity.

It is often stated in forensic science testing that less stringent controls must be accepted because they have to deal with material under much more adverse conditions than ordinary laboratories. Their blood samples as in the Chamberlain case, may be years old dried material affected by climate and weather.

But acceptance of lower standards of scientific proof by forensic science laboratories, although commonplace, should not be acceptable. The only rationale for such acceptance must be that the role of forensic science laboratories is only to put "icing on a prosecution cake", for a case that has already been decided before the court hearing, indeed before the forensic science laboratory has been called in.

There can be no doubt that the Prosecution pursued their so-called scientific enquiry without scientific objectivity, looking only for evidence to bolster up a preconceived opinion. I have seen nothing to suggest that this lack of scientific objectivity is not the rule in Australia. The Defence is unable to contest such scientific evidence appropriately because it lacks first access to the test objects and the resources of the Crown Prosecution to examine the scientific evidence. Indeed in Australia with its small population and small numbers of scientific experts, the Prosecution by first access may saturate all or most of the available talent of scientific experts and leave nobody able to give expert evidence for the Defence.

This is clearly an unsatisfactory state of affairs, and there has been a glaring example in the Chamberlain case.

In this, doubt, indeed disproof, has been cast on the so-called scientific evidence put forward by the Prosecution. Experts, including myself, maintain that the Prosecution evidence about baby blood in the car was not only not proven, but was refuted to the extent of proving that it could not have been baby blood in the car.

Similar doubt was cast on the whole chain of so-called scientific evidence put forward by the Prosecution.

Thus we have a confrontation of Prosecution and Defence science. On the Prosecution side we have laboratory workers experienced in confirmation or denial of judicial suspicions. Their methods have to be rough and ready, having regard to the public resources at their disposal, and their results have to be produced to a rigid time schedule.

The Defence is even worse off, because it almost always has to rely on opinion about the Prosecution's tests and not on separate laboratory testing.

Let me quote from a recent paper entitled "Science in the Witness Box" from the journal "Chemistry in Australia", August 1984, by B. Selinger.

> "**The Expert Witness.** The *voire dire* by which courts establish whether a witness is an expert on a matter and can therefore give evidence of opinion rather than just fact has a high profile in legal proceedings because the court cannot judge the quality of the expert from his expert evidence. The court is left only with possibility of judging the quality of the evidence by the documented quality of the witness and his/her ability to deal with the theatre of the court. Although in science, reputation is not without its influence, credibility is based almost entirely on evidence. This contrast can be illustrated with the pejorative statements made by the Chamberlain prosecutor, Barker QC, about the defence witness Professor Boettcher as being an *academic* and hence not part of the real world. The effectiveness of this tactic was discussed in a recent issue of the *Australian Law News.*
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> *'Barker very skillfully utilizes his knowledge of a Northern Territorian Jury's distaste for aloof academic experts. He starts off with a simple matching about the complexities of forensic evidence.*
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> *Barker (3158)*
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> *"Could I now turn to the subject of blood, generally. I see your eyes glazing. Like Mr Phillips, I lament those innocent days when I thought a haptoglobin was something which dwelt amongst the flowers in the bottom of my garden".*
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> *Then he moves in for the kill.*
> *Barker (3160)*
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> *"Professor Boettcher, whose academic university life was preceded by life as a school teacher, and who has never been actively engaged in the day-to-day routine work of testing blood stains, whose qualification to enter the arena seemed to be based in part upon a lofty concept of what he was pleased to call the scientific method, who teaches and engages in pleasant research and writes for learned journals about learned articles, never about forensic biology. Never about the dirty side of the profession. Because such things do not exist in the quiet halls of institutes of academic learning" . . . and then concludes . . . "they should recognize that there are scientists who work at teaching, and there are scientists that work at testing blood, and they should leave the field to the professionals".'*
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> The real question at issue here is the assertion that forensic science is a separate discipline which must deal with its own unique problems and develop its own relevant methods."

This is nonsense.

I am a pathologist—without a science of my own. I practise biology, chemistry, physics, immunology, genetics and so on. These

are the sciences. There is no such separate entity as Forensic Science, but only the practice of the sciences, I have named, for forensic purposes. The science is the same and the methods are the same and the level of proof is the same throughout.

One problem today—acute in Australia—is that public resources are inadequate to equip Forensic Science laboratories with the full spectrum of relevant laboratory scientists covering all disciplines. Each discipline needs its own expert, and all need trained scientists—not technologists—for their practice.

The other great problem is the relationship of our Forensic Science Laboratories with the police and the predictable lack of objectivity and fair play that has been a clear consequence.

There seem to be two possible answers for "Scientific Evidence and the Law"—

Either we continue with the present adversarial system but give the Defence, in major issues such as murder, at least recourse to equal expert resources commanded by the prosecution.

Or, we institute an independent Forensic Science system which can act objectively to seek evidence of fact, rather than confirmation of opinion. However, this will also always have an adversarial quality in the Court with the Forensic Laboratory then providing a third force.

Thus, I am compelled to think that adversarial science should be decided out of Court, e.g. in Judge's Chambers between experts. A jury can judge between the histrionic abilities of scientists and lawyers, but not between the niceties of scientific facts.

With the sciences advancing beyond the ken of anyone other than specialists in particular fields, this will escalate from the jury in the Chamberlain trial being asked to adjudicate without possible comprehension of the results on Ouchterlony double immunodiffusion, isolectric focussing, and phosphoglucomutase tests, to even more incomprehensible things such as computer fraud.

The system we now have is inadequate. It must be changed—not bolstered up by Federal and High Courts patching up what we have got at the expense of the chance victim of legal misfortune.