Scientific Evidence and Criminal Proceedings: The Italian and Japanese Experience

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Abstract

The use of scientific evidence in court raises several problems in both Italian and Japanese jurisdictions. The authors, starting from the problem of admissibility, discuss two main cases of misuse of scientific evidence: the Amanda Knox case in Italy and the Ashikaga case in Japan. In both cases the trial court condemned the defendant on the basis of corrupted science (DNA fingerprint). The authors conclude that a better handling of this kind of evidence is needed taking into account that errors are inevitable and judges are not able to evaluate science and its reliability.

I. The Use of Scientific Evidence in Criminal Courts in Italy

The use of scientific evidence in criminal courts in Italy[1] is increasingly widespread. Beside the 'old fashioned' forensic techniques – such as traditional fingerprint, toolmarks and firearms identification etc – newer technologies are gaining a fundamental role. Among them we can mention DeoxyriboNucleic Acid (DNA) fingerprint in its last and more advanced developments.[2] The increasing reliance on scientific evidence in criminal proceedings poses the problem of how to assess scientific evidence in court. Judges (and lawyers as well) should be aware of basic scientific principles and their epistemological foundations in order to make a truly informed use of these new technologies and to avoid uncritical phenomena of 'science fascination'.

Unfortunately, the reality is quite different.

On the one hand, judges scarcely have any scientific knowledge or education. Law schools only teach… law. Biology, statistics, physics, physiology are all subjects foreign to the body of knowledge of jurists. In Italy, judicial training[3] is

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[1] On this matter G. Gennari, *Nuove e vecchie scienze forensi alla prova delle corti* (Santarcangelo di Romagna: Maggioli, 2016).

[2] The last frontiers are low copy number, highly mixed DNA profiles, phenotypic DNA etc.

[3] Judicial training is under the competence of *Scuola Superiore della Magistratura* (Superior school for magistrates). The School organizes several courses each year. Every Judge can apply for participation in these courses. Participation is not mandatory, nonetheless it is taken into account during judicial carrier.

also mainly focused on strictly legal issues (law interpretation, jurisprudence...).

On the other hand, the Italian code of criminal procedure does not provide any specific rules regarding scientific evidence. When the Italian legislator adopted the adversarial system in 1988 with a totally new procedural code, the 'expert witness'[4] – well known in the American legal system[5] – was not introduced. As a matter of fact, scientific evidence is admissible in court, in conformity with the general rule of Art 190 of the Italian Code of Criminal Procedure. This means that scientific evidence, similarly to any other evidence, is always admissible upon request of the parties. It can be rejected only when it is manifestly non-relevant or redundant and this happens only rarely.

Usually, both parties – the defendant and the public prosecutor – appoint separate experts who prepare, in support of the respective appointing parties' case, a written expert report. The parties then file the reports in court. If the judge is not satisfied (more often, if he or she cannot decide which is the 'best' report), he or she can appoint a court expert in order to obtain a new and impartial report. As a consequence, there is no preliminary filter on the reliability of scientific assumptions, methods or techniques on which the evidence/report is based; and it marks another great difference with the American legal system based on jury trial.

Having both a judge and a jury creates a clear division of tasks: the former to decide what evidence should be considered by the factfinder and the latter to be the factfinder. The judge plays the role of gatekeeper for the jury. During pre-trial hearing he can filter scientific evidence and decide what can be heard by the jury and what cannot.[6]

[4] Federal Procedural Rule: Rule 702. Testimony by Expert Witnesses.

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

(a) the expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;

(b) the testimony is based on sufficient facts or data;

(c) the testimony is the product of reliable principles and methods; and

(d) the expert has reliably applied the principles and methods to the facts of the case'.

[5] Expert testimony must meet a higher standard of reliability than lay testimony. Cf M.J. Saks and B.A. Spellman, *The Psychological Foundations of Evidence Law* (New York: New York University Press, 2016), 121.

[6] Because it is unreliable and misleading for the jury. The standard for the decision is the Daubert standard (*Daubert* v *Merrell Dow Pharmaceuticals,* 509 U.S. 579 (1993)). Scientific evidence is admissible:

Whether the theory or technique employed by the expert is generally accepted in the scientific community;

Whether it has been subjected to peer review and publication;

Whether it can be and has been tested;

Whether the known or potential rate of error is acceptable; and

Whether the research was conducted independent of the particular litigation or dependent on an intention to provide the proposed testimony.

In Italy there is no jury in criminal as well as in civil proceedings.[7] The professional judge (sitting alone or in a three-judge panel) admits the evidence and assesses it as well.[8]

Now, the question is the following: is the Italian system reliable? Can judges really assess and discriminate good and bad science only on the basis of the expert reports? Probably not.

Here is one of the most intriguing and (internationally) famous case in which the use of scientific evidence became infamous.

II. DNA Low Copy Number in the Legal Context

Meredith Kercher was a young English student at the University of Perugia.[9] On 1 November 2007, during the night, she was raped and murdered. After a few weeks of turbulent investigations, suspects fell on two other students, Amanda Knox and Raffaele Sollecito. The most important piece of evidence is a (supposed to be) blood[10] stain found on the blade of a knife belonging to Amanda. DNA from the bio sample is extracted and analysed in order to obtain a profile. During the debate in court the officer in charge for the forensic laboratory of the *Polizia di Stato* (Italian Police) declares a full match with the poor victim's DNA. The knife, according to the results of the investigation, was the murder weapon. That would be hard evidence against the defendants.

Unfortunately, the matter was much more complicated.

The bio sample was so scarce (probably only a few cells)[11] that it fell into the realm of 'DNA low copy number'.

This term is used when the estimated quantity of DNA present in a sample is less than one hundred-two hundred pg (picograms).[12] Consequently, these

[7] In Court of Assise (it is the court in charge for murder cases, international terrorism and other few serious crime) there are lay judges (five). Nonetheless, they sit on the bench together with professional judges (two).

[8] Similarly, even in the United States the Daubert standard does not apply in bench trial (trial without a jury). See G. Gennari, 'I criteri di ammissione della prova scientifica nel contesto internazionale', in G. Canzio and L. Luparia eds, *Prova scientifica e processo penale* (Milano: CEDAM, 2018), 165-199.

[9] This case is widely debated in J. Vuille et al, 'The Importance of Having a Logical Framework for Expert Conclusions in Forensic DNA Profiling. Illustrations from the Amanda Knox Case', in R.C. Huff and M. Killias eds, *Wrongful Convictions & Miscarriages of Justices* (New York-London: Routledge, 2013), 8.

[10] Because of the very low quantity it is impossible to identify without any doubt the biological array of the stain.

[11] The Forensic Lab did not have the instrument power enough to determine exactly the quantity of DNA. It was surely under nine point ninety-nine picograms (a pictogram is a billionth of a gram) given that the Qubit fluorimeter used by the Police gave a result 'too low' and the sensitivity threshold of this instrument is ten picograms.

[12] B. Budowle et al, 'Validity of Low Copy Number Typing and Applications to Forensic Science' 50 *Croatian Medical Journal*, 207-217 (2009); J. Buckleton and D. Taylor, 'Do Low

samples may undergo special procedures developed to increase assay sensitivity. Commonly, this means a greater amount of copying via *polymerase chain reaction* with increased PCR cycles (twenty-eight cycles increased to thirty-one or thirty-four). Thanks to modern PCR kits even a few cells can be analysed for DNA typing.

The other side of the coin is that the increased number of cycles increases as well the probability of stochastic effects such as allele drop-in, allele drop-out and artefacts appearing (*stutter*). Moreover this technique also increases the risk posed by contamination of samples. The augmented amplification cycles may as well amplify even the minimum amount of contaminating traces substantially enough to make the final profile disputable or unusable.

Admissibility in court of low copy number is under scrutiny in many jurisdictions.

English courts usually admit Low Copy Number (LCN) DNA, nonetheless posing some rules[13] as stated in the famous 'trilogy'[14] by Lord Justice Thomas. These rules sound as:

- DNA shall always be quantified;
- stochastic threshold should be drawn between one hundred and two hundred pg;
- above the threshold DNA profiles should be deemed always reliable and a challenge (in court) to the validity of the method should no longer be permitted;
- below the threshold 'the evidence may properly be adduced and it must then be addressed and its weight established by the adversarial forensic techniques'.[15]

The Court's view – in a few words – is that LCN DNA is

> 'well established to pass the ordinary tests of reliability and relevance (…), in cases where there is clear evidence (adduced in the manner discussed) that the profiles are sufficiently reliable'.[16]

In the United States admissibility of LCN DNA is still far from being largely affirmed. In February 2010 an important *Frye hearing* in the New York State Supreme Court ruled in favour of admissibility.[17] The hearing involved extensive

Template DNA Profiles Have Useful Quantitative Data ?' 16 *Forensic Science International*, 13-16 (2015).

[13] The same rules and principles are followed in New Zealand (*Micahel Scott Wallace* v *The Queen*, [2010], NZCA 46).

[14] They are three decisions from the England and Wales Court of Appeal: *Regina* v *Reed and Garmson*, [2009] EWCA Crim, 2698; *Regina* v *Broughton* [2010] EWCA Crim 549; *Regina* v *C*, [2010] EWCA Crim 2. In all these cases the presiding judge was Justice Thomas, a well-known and revered jurist.

[15] *Regina* v *Broughton* [2010], n 14 above.

[16] ibid.

[17] *The People of the State of New York* v *Megnath*, Ind no 917/2007.

testimony by scientists from NY OCME (Office of the Chief Medical Examiner) – the governmental agency[18] that conducted the genetic analysis – and other experts appointed by the defendant. The court, in its final statement, found that 'LCN DNA testing as conducted by the OCME is generally accepted as reliable in the forensic scientific community'. Few years later even a federal court[19] confirmed the OCME good fame. Again, LCN was deemed admissible because OCME adopted long lasting internal validation procedures regarding LCN through the analysis of more than eight hundred samples.

These decisions are more on the good job done by NY OCME rather than the general reliability of the LCN method. Changing the laboratory, the outcome changes too.

In the same period, the federal district court of New Mexico[20] rejected expert witness on LCN after a very conflicted Daubert hearing. This time the DNA profiling was carried out by the local forensic laboratory (NMDPS). According to its internal protocols, the stochastic threshold[21] for that laboratory was two hundred fifty pg, whereas the sample analysed in this specific case was two hundred fifteen pg. The court pointed out that the question

> 'is not whether it is possible to perform LCN testing reliably – but instead whether the LCN testing performed in this case, by the NMDPS, is reliable',

and the decision is against the laboratory. They did not have any experience in the field of LCN – the court says – and they did not demonstrate the competence to produce results. During the direct examination, the public prosecutor asked the scientist responsible for the laboratory:

> 'and for example if you see stochastic effect at one locus, why are others still reliable'.

The answer is puzzling: 'just based on my experience'. Personal experience is not objective and verifiable… it is not science.

In conclusion, LCN still has many twists and turns in the USA.

After all, it is not really important to establish if LCN is admissible or not in Great Britain, USA or any other country. It is much more important to point out that there is a strong debate in these countries; in court and among the community of forensic scientists.

[18] It is one of the most prominent agencies with a long standing routine use of LCN DNA technique in the United States.

[19] Federal Court for the Southern District of New York, *United States* v *Morgan*, 12-cr-00223. See also Bronx Supreme Court, *People* v *Garcia*, 2013 NY Slip Op. 23053.

[20] *United States* v *McCluskey*, Cr no 10-2734 JCH, 20 June 2013.

[21] The threshold below which the DNA fingerprinting enter in the potential danger zone of unreliable results.

III. The *Amanda Knox* Case and Future Perspectives

In the case of Meredith Kercher, the genetic evidence submitted in court was undoubtedly problematic. The Italian police had no experience in LCN analysis, no reliable protocols, and no the possibility to quantify the DNA sample. The defendants harshly criticized the report filed by the police, explaining that the amplification of the sample – the most sensitive phase in LCN – was not repeated and verified and international standards regarding LCN were not fulfilled. Consequently, they asked the court to appoint a new and independent expert in order to have a new and impartial report.

The courtrejected the request, and held that a report by a court-appointed expert would have only added another interpretation (to those of the defendants and the public prosecutor) and it would not have solved the problem of assessing which was the correct interpretation in the case.[22]

The real point is that Italian court was totally unaware of the sharp international debate rising around LCN. In court's mind the attack against LCN performed by the police was nothing but usual defensive arguments. So that it was just easier to trust more the interpretation offered by the 'governmental laboratory' than the opinion of the 'private experts' appointed by the defendants.[23] Unfortunately, it was a fatal error.[24] And this error was totally clear when the Court of Appeal[25] before and Supreme Court[26] after reversed the judgment of the trial court.

The trial court's judgement had a large mass media coverage all over the world. Amanda Knox was an American citizen and this fact transformed a legal matter into a political dispute. A few months later an international congress on LCN, with the most prominent American and Italian forensic experts, was held in Rome. Put simply, the decision aroused a large discussion among scholars and jurists on how to assess scientific evidence in court and avoid the use of corrupted or non-reliable science. It has been proposed that the court should always appoint an independent expert simply at the request of the parties.[27] Others have suggested that the introduction of a 'daubert standard' style filter

[22] Corte di Assise Perugia 5 December 2009 no 7, available at https://tinyurl.com/yc9tbmjt (last visited 15 November 2018). The defendants where condemned for murder. The sentence was reversed, after six years, by the Supreme Court (Corte di Cassazione 7 September 2015 no 1105, available at https://tinyurl.com/yccjr4wp (last visited 15 November 2018).

[23] Very often courts decide on the base of a sort of 'principle of authority' and this 'authority' always falls on the side of the public prosecutor.

[24] L. Luparia et al, 'La prova del DNA nella pronuncia della Cassazione sul caso Amanda Knox e Raffaele Sollecito' *Diritto penale contemporaneo*, 155-161 (2016).

[25] Corte di Assise di Appello Perugia 3 October 2011, available at https://tinyurl.com/y7fsldc3 (last visited 15 November 2018).

[26] Corte di Cassazione 7 September 2015 no 1105, n 22 above.

[27] P. Tonini, 'Dalla perizia prova neutra al contraddittorio sulla scienza' *Diritto penale e processo*, 360 (2011).

according to which court should admit or assess scientific evidence.[28] That discussion is still going on and probably it will never stop just because there is no magic formula. In order to improve the quality of the decisions involving scientific issues, it is fundamental to adopt a wholistic approach. The 'recipe' should include: promoting a strong educational training for lawyers and judges on the basic principles of science and scientific knowledge; disseminating among judges standards and protocols approved by scientific organizations;[29] adopting strategies in order to prevent cognitive biases during acquisition and assessment of the evidence; promoting a strong selection among experts, binding them to quality and ethical guidelines; ensure the real independence (from the law enforcement agencies) of the scientific laboratories. It is a long way to go. Nevertheless it is unavoidable to start working immediately if Italian judicial system wants to maintain a good degree of credibility on the international stage.

IV. The Use of Scientific Evidence in Criminal Courts in Japan

In Japan, it has long been emphasized that it is important to apply scientific knowledge and new technology not only for investigation but also for fact-finding (either against or for the accused) by courts. Especially for the Japanese criminal justice, under the slogan, 'from subjective evidence to objective evidence', scientific evidence has been expected to change the situation in which investigation and fact-finding have depended so much on confession of the accused.

At the same time, it is often warned that it is dangerous to rely on scientific evidence. In fact, there have been several cases of false charge and judgment caused by scientific evidence. It has been pointed out that the judges are not able to assess substantially or exactly the meaning of the evidence because of its highly technical character, but on the other hand, are likely to believe the reliability easily because it is 'scientific'. The competence and impartiality of the experts have been also disputed.

V. How was Scientific Evidence Handled in the Japanese Criminal Justice?

Although both the importance and the risks associated with scientific evidence have been emphasized for a long time, 'scientific evidence' has not been clearly defined. For instance, both DNA fingerprints, blood type tests or polygraph tests, and expert analysis on handwriting, voiceprints, hair identifications or dog sniff tests are often classified as 'scientific evidence'. However, the admissibility

[28] Corte di Cassazione 17 September 2010 no 43786, available at https://tinyurl.com/y9d76z2c (last visited 15 November 2018).

[29] ENFSI (European Network of Forensic Science Institutes) is particularly active in Europe.

of this type of evidence is determined on the basis of 'natural or legal relevancy' standard, like all the other types of evidence. This might mean that the problems specific to scientific evidence have not been fully interrogated in Japan.

Art 317 of the Japanese Code of Criminal Procedure provides that 'facts shall be found on the basis of evidence'. This provision has been interpreted to require not only that the court's fact-finding is based on 'evidence', but also that the facts are established on the basis of evidence admissible according to the evidential rules provided in the Code of Criminal Procedure, for example, exclusionary rule of forced confession (Art 319) and hear-say rule (Arts 320-328). There are also rules, though not explicitly provided by law, accepted and developed by doctrine and/or case law especially under influence of the US law and theory, for example, natural and legal relevancy and exclusionary rule of illegally collected evidence.

The admissibility of scientific evidence, like other types of evidence, is determined on the basis of such evidentiary rules. Among the rules governing the admissibility of evidence, the most relevant and important rule for scientific evidence has been considered to be 'natural and legal relevancy'. This concept was introduced in the Japanese theory on criminal procedure under influences of a theory in the US at that time.[30] According to this concept, when evidence has in its nature no or too little probative value, it has no natural relevancy and is not admissible. For example, simple opinion, reputation, or imagination is not admissible because it is not empirically or logically relevant to the fact to be proved. On the other hand, evidence lacks legal relevancy, when it is typically likely to entail risks of wrong judgments or unjust prejudice of judges. Evidence that may produce confusions in issues is also considered to be legally irrelevant.[31]

The doctrines have long analyzed the admissibility of scientific evidence using the 'natural and legal relevancy' framework. However, they have not sufficiently examined the problems proper to 'scientific evidence' and its definition. Empirical or logical relevancy or reasonability of inference has been mainly discussed and proper rules to determine 'scientific evidence' have not been established. Similarly, the courts have not been conscious of the problems peculiar to scientific evidence. Moreover, they seem to have been reluctant to categorically exclude certain type of scientific (or expert) evidence and tend to reduce the problem to the question of probative evaluation. In fact, the Supreme Court has affirmed in concrete cases

[30] Especially the concept of 'legal relevancy' by J.H. Wigmore (J.H. Wigmore, *A Treatise on the Anglo-American System of Evidence in Trials at Common Law* (Boston: Little, Brown and Company, 3rd ed, 1940), 1, 298). See also G. Naruse, 'Admissibility of Scientific Evidence (1)' 130(1) *Journal of the Jurisprudence Association (Tokyo University)*, 14 (2013).

[31] For example, the Supreme Court denied the admissibility of the evidence on the past similar offense(s) or conduct(s) committed by the accused in order to establish his/her identity with the author of the offense charged, because it might entail judge's prejudices on the criminal inclination or confusion in the hearing SC 7 September 2012, *Keishu* 66-9, 907; SC 25 February 2013, *Keishu* 67- 2, 1.

the admissibility of the result of handwriting analysis,[32] polygraph test,[33] dog sniff tests[34] etc, though admonishing that the courts shall carefully evaluate the probative value.[35]

According to the Japanese code of criminal procedure, courts are considered to have discretion to decide which evidence is to be examined in trial. In particular, the court may decide at its discretion if it is necessary or appropriate to examine a certain document or article of evidence in trial. But it is not imaginable for courts to deny the necessity to examine scientific evidence that the court deems to be relevant to the fact to be proved.

In summary, the standards in order to determine the admissibility or to assess the relevancy and reliability of scientific evidence have not been established in Japan.

VI. The *Ashikaga* Case and DNA Type Analysis

However, as in Italy, the use of a result of DNA type analysis in a concrete case in Japan as evidence to establish the identity of person who commits a crime and to link the person to the crime has is currently being interrogated. In particular, the *Ashikaga* case, in which the accused was convicted on the basis of DNA type analysis and was incarcerated for seventeen years but found innocent in retrial as a result of a new, more advanced DNA type analysis,[36] confronted the criminal justice system with the serious problem of 'scientific evidence'.

In 1990, a missing four-year-old girl was found dead at a riverside in Ashikaga City, Tochigi Prefecture.[37] It was confirmed that she was strangled to death and a lot of sperm was found on her short-sleeves shirt left at the riverside. The next year Mr Sugaya, a kindergarten bus driver, was arrested and prosecuted of the murder of the girl.[38] His arrest was founded mainly on the confession, which was later found to be false, acquired in the police interview by showing him the

[32] SC 21 February 1966, *Hanrei-jiho* 450, 60.

[33] SC 8 February 1968, *Keishu* 22-2, 55.

[34] SC 3 March 1987, *Keishu* 41 -2, 60.

[35] Art 318 of the Japanese Code of Criminal Procedure provides that the probative value of evidence shall be left to the free discretion of the judge, namely does not provide any formal restriction to the evaluation of evidence. Of course it does not mean that arbitrary evaluation of evidence is permitted; it shall be empirically and logically 'reasonable'.

[36] For the details of the case, see H. Sato, 'Report on the Ashikaga Case' 71 *Quarterly Keiji-Bengo*, 25 (2012); K. Honda, 'The Ashikaga Case of Japan – Y-STR testing used as the exculpatory evidence to free a convicted felon after 17.5 years in prison' 7 *Forensic Science International: Genetics*, 1-2 (2013).

[37] Two similar cases occurred in a residential area in 1979, 1984 and 1996 when he was detained. This fact would have suggested that the Ashikaga case was a part of serial murders of young girls and Mr Sugaya was not the author. See K. Honda, n 36 above, 2.

[38] It is harshly criticized that the police improperly drove Mr Sugaya to confess by showing the result of incorrect DNA analysis. See H. Sato, n 36 above, 25.

result of analysis on D1S80 type DNA of the sperm on the victim's shirt conducted by the National Research Institute of Police Science (NRIPS).

According to the NRIPS report, both the sperm on the victim's shirt and Mr Sugaya had sixteen-twenty-six (D1S80 type DNA) and B (ABO blood typing). However, as to the D1S80 typing method, a serious scientific problem was pointed out after the result of the original DNA test was submitted to the court. Responding to it, the NRIPS changed the original typing and revised the results from sixteen-twenty-six to eighteen-thirty during trial. However the NRIPS insisted the DNA type of the sperm was the same as that of Mr Sugaya.

In trial of the first and second instance, the admissibility and reliability of the result of analysis on the DNA type became an issue. However, the court of the first instance, Utsunomiya District Court, admitted the evidence and convicted Mr Sugaya. The accused appealed, but the court of the second instance, Tokyo High Court rejected it. The court defined scientific evidence as a result of the inspection and analysis by means or methods that are beyond the one by normal senses on a certain phenomena or action. The court held that in order to admit such scientific evidence in criminal trial, not only the fundamental principles of the analysis shall be founded scientifically but also the means or methods shall be appropriate and typically reliable. As a result, the court affirmed the admissibility of the NRIPS report on the Mr Sugaya's DNA fingerprints.[39]

The Supreme Court supported the decision of the Tokyo High Court, rejected the defense's recourse, and found that the NRIPS report was admissible because the inspection and analysis on the DNA fingerprints were conducted in accordance with scientific principles that were theoretically correct, by the persons who mastered the proper skills and by means and methods scientifically reliable.[40]

As a result, the imprisonment for indefinite term sentence (life sentence) against Mr Sugaya had become final and binding and he was incarcerated in the Chiba prison on 17 July 2000. However, Mr Sugaya continued to protest his innocence from inside of the Chiba prison and repeatedly demanded DNA re-testing and a retrial (revision). In 2008 the Tokyo High Court, accepting his request, and nominated two forensic scientists for the re-test: one recommended by the prosecution and the other by the defense. The shirt was divided between the two experts, who accomplished newly the DNA analysis. It was a very difficult mission because 19 years had passed since the crime had occurred and the crime scene sample had become very old and was in bad condition.[41] Nevertheless, the new DNA analysis with more advanced method (Y-chromosomal STR testing) conclusively showed that he could not be linked with the murder.

Thus, on the basis of the new DNA analysis, Mr Sugaya was released from

[39] Tokyo High Court 9 May 1996, *Kokeishu* 49-2, 181.

[40] SC 17 July 2000, *Keishu* 54-6, 550.

[41] According to H. Sato, n 36 above, 26, the shirtsleeves' shirt was not conserved under the controlled temperature.

the jail in 2009 after more than seventeen years of imprisonment and acquitted definitively by the court of retrial in 2010.[42]

VII. The Situations After the *Ashikaga* Case

The Ashikaga case was taken seriously, because on the one hand it was a DNA type analysis that caused the erroneous judgment, yet on other hand, the evidence that allowed the error to be discovered, and which allowed Mr Sugaya to be released from the jail was also a DNA type analysis. It is worth noting that the DNA type analysis that caused false conviction against Mr Sugaya was conducted using a primitive method, whereas the one that saved him from prison was more advanced. Successively, other cases, in which result of the old method of DNA type analysis was used as decisive evidence to establish the identity of the accused with the author of the crime, were reexamined, and some of them were found erroneous.[43]

The situation became even complicated because the institution of *saiban-in*, the participation of the lay judges with professional judges in criminal trial on heavy offenses, was introduced in 2005 and started in 2009. Thus the practice and the doctrine were faced with the serious problem: How do we handle the scientific evidence in criminal proceedings with the participation of lay judges.

Since the year 2010, research into, and discussions relating to scientific evidence have intensified. For instance, the Judicial Research and Training Institute of the Supreme Court conducted a research on scientific evidence focusing especially on the DNA type analysis in 2010 and the report was published in 2013.[44] However, report was harshly criticized by some authors for being too optimistic about the reliability of the recent method of DNA type analysis.[45]

After the Ashikaga case, interest in comparative research, not only into the development of the case law and disputes in the United States including the Frye and the Daubert standard, and the reform of the Federal Rules of Evidence in 2000 but also into the situations in other common law countries, for example the UK and Australia intensified among scholars.[46]

However, many problems still remain unsolved and for the Japanese judicial

[42] Utsunomiya District Court 26 March 2010, *Hanrei-jiho* 2084, 157.

[43] The most famous is the so-called murder of a woman working for Tokyo Electric Power Company, in which the Nepalese accused, Mr Govinda Prasad Mainali was released after fifteen years of wrongful imprisonment. See M. Ibusuki et al, 'Scientific Evidence and Criminal Trial' *Quarterly Keiji-Bengo*, 76, 82 (2013).

[44] The Judicial Research and Training Institute, *Scientific Evidence and Criminal Trial* (Tokyo: Hosokai, 2013).

[45] M. Ibusuki et al, n 43 above, 76.

[46] Y. Tsujiwaki, 'Relevancy and Reliability of Scientific Evidence' 7 *Meiji Law School Review*, 413 (2010); G. Naruse, 'Admissibility of Scientific Evidence (2)-(4)' *Journal of the Jurisprudence Association (Tokyo University)*, 130(2), 386; 130(3), 573; 130(4), 801 (2013).

system it is important to start working on these issues with urgency.

First, there is a need to establish standards or criterion to determine the admissibility of scientific evidence and assess its reliability.

As for the admissibility, three standards can be from the holdings of the Supreme Court on the Ashikaga case; 1) if the scientific principles used for the inspection and analysis are theoretically correct or not; 2) if the inspection and analysis are conducted by the persons who mastered proper skills or not; 3) if the means and methods used for the inspection and analysis are scientifically reliable or not.

Of course these standards are still too vague and abstract, because they do not even define 'scientific evidence' and each standard needs precision to function substantially as a formula to determine admissibility of scientific evidence. In fact, it did not work well in the Ashikaga case so as to screen out the primitive method of DNA type analysis and failed to prevent the serious error of judgment. However, simple importation of the Frye or Daubert standard or any other foreign standards might not be solution neither in Japan: we need to refine the definition of scientific evidence and standards to determine the admissibility, and in reconstructing the law on evaluating scientific evidence.

Secondly, we need to prepare institutions to ensure that judges (and prosecutors and lawyers) can substantially and correctly evaluate the relevancy and reliability of scientific evidence. The scientific education and training of judges, though a plausible solution is a limited one, in light of the fact that it is impossible for them to learn all the fundamental principles of each domain of science. Moreover, the evaluation of the relevancy and reliability is not only a matter of correctness of scientific principles and methods but also a matter of human error. Because even if the principles and methods used for inspection and analysis of scientific evidence were theoretically correct, the result is reported by humans, who are not completely exempted from error, prejudice or impartiality. Thus we need to have reasonable procedural institutions so as to avoid such risks.

Thirdly, it is important to reserve the possibility to retest the evidence and to revise the judgment. The possibility to revise the judgment might be guaranteed institutionally by admitting relatively broadly re-examination of the evidence and appeal or retrial. Whereas possibility to retest the evidence is reserved factually by conserving good conditions of the samples so as to avoid the degeneration and contamination. In order to reserve the possibility, the scientifically appropriate conservation of the samples is indispensable.

It is even more important if we consider the development of science and technology. The Supreme Court, in the Ashikaga case, held that the probative value of the evidence shall be estimated carefully taking into consideration the facts newly discovered as a result of the subsequent development of science and technology. Nevertheless, the Court rejected the request for re-test of the DNA

type by a more advanced method demanded from the defense.[47] If the Court had ordered the re-test at that time, the error could have been discovered much earlier.

Mistakes and errors are inevitable in the human world, no matter how much advanced and developed the science. So the most important thing in handling scientific evidence for all the people who concern the Criminal Justice is to be always conscious of the possibility of error in assessment or judgment as well as to be honest and courageous to acknowledge mistakes when discovered.

[47] H. Sato, n 36 above, 26.