How Courts Decide Reliability: Lessons from the Third Circuit's *Anderson* Decision

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"If you dislike jargon, buckle up."
– Judge Emil Bove

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The DNA evidence

On October 31, 2019, while executing a search warrant of Hunter Anderson's home in Centre County, Pennsylvania police found a Smith & Wesson .40 caliber firearm.

The crime lab found a DNA mixture on the gun whose complexity gave "**no interpretable results**." As such, "no comparison could be made to" suspect Anderson.

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The TrueAllele® technology

- Fully Bayesian analysis preserves identification information
- Separates DNA mixtures into contributor genotypes
- **Automated, accurate & objective**

1999. Invented effective DNA mixture separation
2001. Published first probabilistic genotyping paper
2005. World Trade Center PG database
2009. First PG use in court: *Pennsylvania v. Foley*

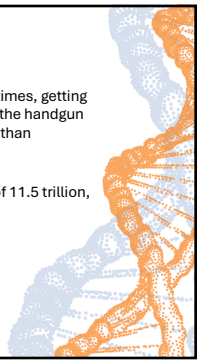
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The TrueAllele® results

Cybergenetics ran TrueAllele on the gun evidence five times, getting consistent results. We reported that a match between the handgun and Anderson was "**11.5 trillion** times more probable" than coincidence.

We also reported an error rate – "for a match strength of 11.5 trillion, only *1 in 146 trillion people* would match as strongly."



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The opposition challenge

Anderson's defense team **challenged TrueAllele reliability**. Their motion conceded key *Daubert* reliability prongs – the software was tested, peer reviewed and published.

Moreover, they **acknowledged Cybergenetics transparency** in having previously let defense experts review its source code, the trade secret text underlying testable software.



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The *Daubert* standard

When can courts rely on scientific findings to make judicial determinations? Why should we trust TrueAllele's reported 11.5 trillion match statistic? By what standard can a judge – who is not a scientist – establish the reliability of a scientific methodology?

The 1993 US Supreme Court developed five *Daubert* prongs – **testability, peer review, error rate, standards, and general acceptance**. A judge can apply these prongs to a proponent's scientific methodology to assess its reliability as evidence.



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Prong 1. Testability

Question: Is TrueAllele capable of being tested?

The *Daubert* issue is whether the expert's methodology can be objectively tested or merely reaches unchallengeable conclusions.

"TrueAllele can be tested," wrote the Third Circuit, "by creating multi-source DNA mixtures in lab settings for the software to analyze." Based on such data, false negative and positive outcomes can be observed. That suffices, said the Court.

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Opposition

But the defense didn't test anything, noted the Court, despite being given every opportunity. They had access to the TrueAllele method, a computer for running the software, relevant case and validation DNA data, and testing results. They could have conducted their own scientific testing to challenge the software's methodology. Or to contest the testing of our 42 validation studies.

Instead, they insisted on having TrueAllele source code. Not just to inspect; their experts had already done that for a week in another case. But to possess sensitive trade secret materials for uses unrelated to standard empirical forensic testing.

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The Court

The appellate court would "not authorize a fishing expedition through TrueAllele's source code under the auspices of *Daubert*. For purposes of testability, what matters is that the challengers of the methodology could run scientific tests to try to show that TrueAllele does not function in the manner that the government's expert described." They could have but didn't.

Answer: The government established that TrueAllele's testability supported a finding of reliability.

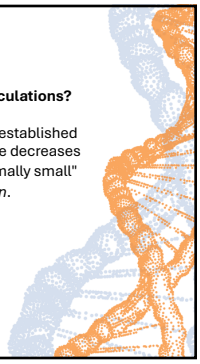
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Prong 2. Error Rate

Question: Is TrueAllele susceptible to error-rate calculations?

The Court noted that TrueAllele validation studies had established the software's false positive error rate. That its error rate decreases with increasing match strength. And that an "infinitesimally small" error rate of *one in 146 trillion* was reported in *Anderson*.



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Opposition

The Defendant argued that "these error rates are inaccurate because, in his view, they fail to account for potential errors by software operators and problems lurking in TrueAllele's source code."

He cited a general error rate of "six errors per thousand lines of code."



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The Court

"We are left, then," concluded the Court, "with little more than **defense speculation** that people sometimes make mistakes, source code sometimes contains errors, software sometimes malfunctions, and TrueAllele may suffer from one or more of these issues." But "these concerns are not substantial enough to undermine reliability under *Rule 702*."

Answer: The government demonstrated that it is possible to calculate error rates relating to TrueAllele's performance, and that the software's error rates are low.
These considerations also favored admissibility.



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Prong 3. Standards

Question: Is TrueAllele governed by standards that can be applied to reduce errors?

Cybergenetics complies with standards for empirically validating PG software. These national standards were established by the FBI's *Scientific Working Group on DNA Analysis Methods* (SWGDAM), ANSI/AAFS, and other organizations. At the hearing, the government provided TrueAllele exhibits that document testing compliance.

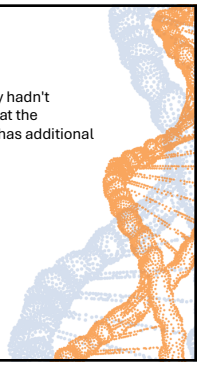


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Opposition

The Defendant objected that the state crime laboratory hadn't followed PG validation standards for TrueAllele. And that the *Institute of Electrical and Electronics Engineers* (IEEE) has additional (voluntary) software engineering standards.



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The Court

But the Court found these arguments unpersuasive. The state laboratory doesn't use TrueAllele, so the PG standards aren't applicable here. And PG software isn't "subject to additional standards" from other fields, "particularly in light of the extent of the existing standards and the weight of the other factors."

Answer: TrueAllele's probabilistic genotyping methodology is governed by the type of standards that are a hallmark of a reliable methodology grounded in hard science. We also care about standards because, if properly applied, they can reduce error rates. That is true here.



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Prong 4. Peer Review

Question: Is TrueAllele a product of peer-review scrutiny?

"Of the *42 TrueAllele validation studies* presented by the government at the Daubert hearing, **eight of them were subject to peer review,**" wrote the Court. "One of the peer-reviewed studies addressed TrueAllele's efficacy with DNA mixtures involving up to 10 contributors*, which are more complex than the mixture swabbed from the gun in this case."

*Bauer, D.W., Butt, N., Hornyak, J.M., and Perlin, M.W. Validating TrueAllele® interpretation of DNA mixtures containing up to ten unknown contributors. *Journal of Forensic Sciences*, 65(2):380-398, 2020.

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Opposition

The Defendant argued that I (the expert) had coauthored seven of the eight published studies. But the Court found that "of little consequence under Daubert." What's important "is that the peer reviews were **conducted by anonymous independent scientists**."

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The Court

Answer: TrueAllele has been subjected to peer review and publication. These processes are not "necessary conditions of reliability." But going through the process is another "component of good science."

(See also *Gissantaner*: "Publication in a peer-reviewed journal alone typically satisfies this *Daubert* inquiry.")

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Prong 5. General Acceptance

Question: Is TrueAllele generally accepted in the relevant scientific field of DNA evidence interpretation?

The Court observed that TrueAllele was deemed admissible in 37 cases* in the United States. And that I had "testified that TrueAllele had been used in a variety of settings for more than 25 years, including by approximately 400 organizations* involved in law enforcement, criminal defense and exoneration work, paternity testing and kinship analysis, and identification of remains."

*Now 50 cases and 600 organizations

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Opposition

The Defendant cited a Ninth Circuit non-precedential discussion about a *National Institute of Standards and Technology* (NIST) report.

A draft NIST report had mentioned a supposed lack of "established and accepted criteria" for low-level complex DNA mixtures. The issue didn't appear in their final report. (And is now a moot point*.)

*Perlin, M.W., Allan, W.P., Bracamontes, J.M., and Legler, M.M. The reliability and reporting of DNA match strength for uncertain genotype evidence. *Heliyon*, 12(7):e44753, 2026.

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The Court

The Defendant also claimed that TrueAllele isn't generally accepted in "the community of computer scientists and software engineers." But the Court said that *Daubert* construes the relevant scientific community more narrowly, here as "forensic geneticists."

Answer: Probabilistic genotyping is generally accepted, for purposes of *Daubert*, in the field of forensic DNA identification. This is another "important factor in ruling particular evidence admissible."

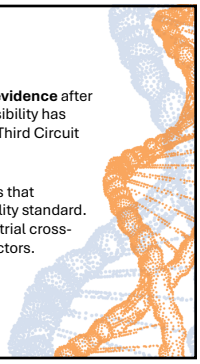
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Conclusions

TrueAllele has been **accepted fifty times as reliable evidence** after admissibility challenge in US courts. TrueAllele admissibility has been affirmed by appellate courts in eight states. This Third Circuit decision now adds a federal appellate court.

The take-home lesson from the *Anderson* affirmation is that TrueAllele PG software **fully meets** the *Daubert* reliability standard. Ineffective opposition arguments may be reworked for trial cross-examination, but they aren't relevant to the *Daubert* factors.



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Perlin, M.W., *DNA Matters*, *Forensic® Magazine*, May 2026.

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