CTS Error Rates, 1992 – 2005

Firearms/Toolmarks

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Errors

True Error

Conclusion that is factually wrong, False Positive (mis-identification, Type I eror) or False Negative (false elimination, Type II error)

“Unexpected Response”

No conclusion in an exam that most qualified examiners would be able to identify or eliminate

Issues with Inconclusives

Human Performance

- Failure to apply an appropriate ID standard

Variation in Test Materials

- Hundreds of test bullets, cartridge cases and toolmarks cannot all be reproduced precisely, therefore some inconclusives in Proficiency or Validity tests may be legitimate and justified.

Analysis of Rates

False Positive Rate

- number of incorrect identification conclusions divided by the total number of exam results given on true exclusions (not divided by the total number of exams)
- this is a standard statistical definition and is described explicitly in the NAS Report

Analysis of Rates

False Exclusion Rate

- number of incorrect exclusion conclusions divided by the total number of exam results given on true identifications (not divided by the total number of exams)

Analysis of Rates

- Sensitivity
  - number of correct identification conclusions divided by the total number of exam results on true identifications
  - may vary considerably depending on tool

Analysis of Rates

- Specificity
  - number of correct exclusion conclusions divided by the total number of exams conducted on true exclusions

The Six Exam-Result Conditions

Each exam result consists of two parts, fact and opinion

There are two possible facts and three possible opinions (ID, INC, EX)

2 x 3 = 6, so there are 6 Exam-Result Conditions

The Six Exam-Result Conditions

When Fact=ID (True ID), Three results are possible:

ID - A correct identification

FE - A false elimination

II - A no conclusion result for a true identification

The Six Exam-Result Conditions, continued

When Fact=Elim (True EX), three results are possible:

EX - Correct Exclusion

MI - Mis-Identification

IE - No Conclusion on a True Exclusion

Collaborative Testing Services

- Forensic Laboratory Proficiency Testing
- Supervised by ASCLD Proficiency Advisory Committee
- U.S. and Foreign Lab participation
- Anyone who buys test can participate

Collaborative Testing Services

" Since it is the laboratory's option how the samples are to be used (e.g. training exercise, known or blank proficiency testing, research and development of new techniques), the results compiled in the summary report are not intended to be an overview of the quality of work performed in the profession and cannot be interpreted as such."

Collaborative Testing Services

March 30, 2010 Statement:

CTS Summary Reports should not be used to determine forensic science discipline error rates.

- Tests may be purchased by anyone
- Some non-forensic science organizations participate
- It is solely the responsibility of the participant or accrediting agency to determine the acceptability of an examiner's response
- Reported results do not reflect post examination scrutiny by reviews such as laboratory quality assurance measures

Issues Noted in CTS Results

- Report language varies considerably
  - “may have been fired in”
  - “was probably fired in”
  - “could not be identified as”
- Some reports appear to be non-native English

Value of CTS Results

- Monitor any trends in error rates
- Determine if certain types of exams are more prone to error, take corrective actions
- Defense of F/T against inaccurate error rate claims
- Despite limitations, useful as a supplement to properly designed validity tests

Classifying CTS Responses

- Each individual conclusion section report is analyzed to determine the total number of exam results and to categorize each as one of the six different exam result types
- If written conclusion is unclear or absent, table results are used

Classifying CTS Responses

- Results with qualifying words or phrases such as "was probably fired from" or "in the condition in which it was received" are treated as inconclusive
- If two tools are provided, Exclusions of a second tool due to an ID to the first tool are not tabulated. By extension, all other tools in the universe could be excluded this way.

CTS Results 1992 - 2005

- Firearms (bullets and cartridge cases)

- False Positive Rate 137/9111 = 1.5%
- False Negative Rate 31/6114 = 0.5%
- Sensitivity 5863/6114 = 95.9%
- Specificity 5203/9111 = 57.1%

CTS Results 1992 - 2005

- Bullets Only

- False Positive Rate 52/2072 = 2.5%
- False Negative Rate 21/2020 = 1.0%
- Sensitivity 1843/2020 = 91.2%
- Specificity 899/2072 = 43.4%

CTS Results 1992 - 2005

- Cartridge Cases Only

- False Positive Rate 59/4851 = 1.2%
- False Negative Rate 6/2406 = 0.2%
- Sensitivity 2365/2406 = 98.3%
- Specificity 2903/4851 = 59.8%

CTS Results 1992 - 2005

- Toolmarks Only

- False Positive Rate 84/4950 = 1.7%
- False Negative Rate 51/3388 = 1.6%
- Sensitivity 3070/3388 = 90.6%
- Specificity 2866/4950 = 57.9%

CTS Results 1992 - 2005

- General Comments

- Bullet false positive (fp) rate is higher than toolmark fp rate
- Firearms fp rate is 1.5%, same as P&M (see Bunch calculations)

CTS Results - 1992, 1993

- Test 92-4, 4 bullets, one Colt 1911 barrel
- Results indicate which responders are trainees
- Trainees Removed vs. Overall

- false id rate 0.00% vs. 0.83%
- false excl. rate 0.65% vs. 1.28%

CTS Results - 1992, 1993

- Test 92-11, a doorknob a a pair of slip-joint pliers
- Results indicate which responders are trainees
- Trainees Removed vs. Overall

- false id rate 0.00% vs. 0.00%
- false excl. rate 6.59% vs. 8.60%

Possible Sources of Error

- Mislabeling of evidence by examiner
- Mislabeling of evidence by CTS
- Mistake in report or notes
- Poor judgment during exam (inappropriate application of identification standard)
- Poor training resulting in inappropriate identification standard
- Microscopic similarity (extremely unlikely, but still theoretically possible)

Developing Statistical Goals

- Lower false positive and false negative rates as much as possible, but what are the side effects?
- Stricter identification standard will likely result in lower sensitivity, i.e., more “no conclusions”

Developing Statistical Goals

- What is the right combination of low false positives and high sensitivity?
- Any proposed or currently used exam procedure, identification standard or QA protocol should be evaluated (at least in part) on its effect on false positive, false negative, sensitivity and specificity rates.

Thank You / Questions

Drug proficiency test false positives: a lack of critical thought

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Drug proficiency tests were surveyed in an attempt to determine the cause of false positive results. The results of seventeen drug proficiency tests and surveys provided by Collaborative Testing Services (CTS) over an eight-year period were evaluated. A total of 63 errors were reported for an average rate of 2.8%. Fifty-six of the 63 respondents responsible for errors had used GC-MS, IR or a combination of the two in their analytical scheme. No errors were reported by respondents using two microcrystalline tests. Further evaluation of the analytical schemes of those responsible for the errors demonstrated that it was not the methodology that resulted in the errors, but rather the lack of critical thought on the part of the analyst.

Es wurde versucht Drogen Ringversuche auszuwerten, um die Ursache falsch positiver Ergebnisse zu bestimmen. Ausgewertet wurden 17 Ringversuche und Tests, welche durch die Collactorative Testing Services (CTS) in einem Zeitraum von 8 Jahren durchgeführt worden sind. Insgesamt fanden sich 63 falsche Ergebnisse entsprechend einer Fehlerquote von 2.8%. In 56 von diesen 63 Fällen ist die GC-MS oder die IR-Spektroskopie bzw. die Kombination beider Verfahren benutzt worden. Unter den Anwendern von Mikrokristalltests fanden sich dagegen keine falschen Ergebnisse. Die weitergehende Auswertung der Analysengänge der Teilnehmer mit falschen Ergebnissen zeigte, daß die falschen Ergebnisse nicht in der Methodik begründet waren, sondern vielmehr auf dem Mangel an kritischen Überlegungen auf seiten des Analysierenden.

Des tests de compétence pour les stupéfiants ont été examinés dans le but de déterminer la cause de faux positifs. Les résultats de dix-sept tests de compétence pour les stupéfiants et d'examens fournis par le Collaborative Testing Service (CTS), qui portaient sur une période de huit ans, ont été évalués. Un total de 63 erreurs ont été signalées, pour un taux moyen de 2,8%. Cinquante-six des 63 personnes interrogées responsables d'erreurs avaient utilisé des GC-MS, IR ou une combinaison des deux dans leur procédé analytique. Aucune erreur n'a été signalée pour les personnes interrogées qui utilisaient deux tests microcristaux. L'évaluation en détail des procédés analytiques des personnes ayant commis des erreurs a démontré que la méthodologie n'était pas la source d'erreurs, mais plutôt le manque de sens critique de la part de l'analyste.

Se revisaron los tests de análisis de drogas con la intención de determinar la causa de los resultados de falsos positivos. Se evaluaron los resultados de diecisiete tests de drogas, utilizados a lo largo de un periodo de ocho años, proporcionados por el Collaborative Testing Service (CTS). Se encontraron sesenta y tres errores, lo que suponía una media de 2,8%. En cincuenta y seis de los sesenta y tres casos se habia usado GC-MS, IR o una combinación de ambos en su esquema analítico. No se reportaron errores cuando se usaron dos tests microcristalinos. Una evaluación posterior de los esquemas analíticos de los responsables de los errores demonstró que no era la metodología la responsable de los errores sino más bien la falta de juicio crítico por parte del analista.

Key Words: Forensic science; False positives; Drug proficiency tests; Critical thought; GC-MS; IR.

Introduction

In 1993, the Oakland Police Department Criminalistics Laboratory underwent a re-accreditation review and inspection by the ASCLD-Laboratory Accreditation Board. During the inspection process and review, some of the inspectors expressed concern regarding the laboratory's use of microcrystalline tests as the primary means by which commonly-encountered controlled substances were identified, even though state-of-the-art technology was available in the laboratory. Further, there were suggestions that instrumental methods provided some safeguards and advantages that did not exist with microcrystalline tests.

The purpose of this paper is to assess the reliability of microcrystalline tests and instrumental methods as demonstrated in proficiency test results. Flinchbaugh [1] felt that the proficiency test provided the highest level of quality-system verification. If instrumental methods are indeed superior to microcrystalline tests, one would expect lower error rates associated with their use on proficiency tests.

Procedure

Seventeen drug proficiency tests and test results [2–17], supplied to numerous laboratories by Collaborative Testing Services (CTS) over an eight-year period, 1985–1993, were evaluated for test results and testing methodology used by the respondent.

Errors were defined as test results which reported either an incorrect identification of a compound present in the sample or the presence of a compound not in the sample provided by CTS. Failures to identify the target compound and results suggestive of some level of uncertainty were not scored.

The percentage frequency of the various testing methods used by the respondents to analyze the sample was determined. Some tests were encountered relatively infrequently and were not reported in this study. In the rare event that the method of analysis could not be adequately interpreted, it was also not incorporated in the study.

Results

The evaluation of errors on 17 CTS tests is summarized in Table 1. The majority of the tests had multiple compounds present in a single sample. In 2237 scoreable tests, there were 48 mis-identifications and fifteen identifications of compounds not present, for a total error rate of 2.8%.

Table 2 shows the breakdown of testing methods employed, giving the percentage frequency of respondents using a particular method for each test. In two tests, 86-1 and 87-1, the testing methods were not reported. The methods were broken down into two categories. The first comprised general classification tests such as colour tests, single microcrystalline tests, ultraviolet (UV) spectroscopy, thin layer chromatography (TLC) and gas chromatography (GC). The second category contained specific tests, used to achieve the identification of a particular compound, including gas chromatography–mass spectrometry (GC-MS), infrared (IR) spectroscopy and at least one or more additional microcrystalline tests.

Table 3 summarizes the errors correlated against the more highly specific analytical methods used by the respondents responsible for the errors. The methods include multiple microcrystalline tests, GC-MS, IR and a combination of GC-MS and IR. Other methods such as nuclear magnetic resonance were encountered very infrequently and were not individually considered. Test 87-1, in which there were two reported errors, did not report the testing methods. These remain unknown.

Discussion

In Table 1, false positives were divided into two different categories to distinguish errors due to the possibility of contamination. Contamination does not necessarily reflect upon the reliability of the method itself, but rather the environment in which that method is being used. Incorrect identifications are rarely the result of contamination whereas contamination is a genuine concern in instances where additional compounds were identified.

False negatives were not considered for the purposes of this study. It is much more difficult to discern the cause of a false negative than either of the two other error types discussed here. The fault may be limitations of methodology as well as limitations of the analyst. Whether one or both of these were the reason cannot be distinguished, based upon a review of this type.

Some trends can be seen by a review of the data on the categorization of methods. The use of GC, TLC and multiple microcrystalline tests has fallen while the use of IR and GC-MS had risen and remains relatively high.

The summary of figures presented in the tables demonstrates clearly one fact – no errors were achieved when two microcrystalline tests were used. In the fifteen tests in which methodology could be evaluated, the total number of test results in which two microcrystalline tests were used was 148. Though this represents only 7.2% of the total number of respondents for these fifteen tests, the fact that not one of these 148 respondents reported an error is significant. If errors were evenly distributed among test procedures, approximately four to five errors would have occurred in the 148 test results in which two microcrystalline tests were used.

Further, 56 of the 63 false positives were reported when either GC-MS, IR or a combination of the two methodologies were used. A closer review of the entire analytical schemes of the respondents providing these false positives revealed not a lack of instrumental reliability but rather a

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TABLE 1 CTS tests and evaluation of errors.

CTS test	*Drug(s) in test sample*	*N Respondents*	*Incorrect Identification*	*Additional Components Identified*	*Total Errors*	*Error Rate (%)*
85-9a	tetracaine, phenylpropanolamine	86	3	1	4	4.6
85-9b	cocaine	86	0	1	1	1.1
86-1	heroin, cocaine, procaine	98	0	0	0	0.0
86-9	methamphetamine, phenylacetic acid	88	2	1	3	3.4
87-1	cocaine base, ephedrine HCl	101	2	0	2	1.9
87-8	MDEA	101	6	1	7	6.9
88-1	cocaine base, cocaine HCl	116	0	0	0	0.0
88-8	TCP HCl, morpholine	118	0	0	0	0.0
89-4	cocaine base, methamphetamine HCl	123	2	2	4	3.2
89-12	N,N-DMA	135	12	2	14	10.3
90-4	testosterone: propionate, cypionate, enanthate	133	1	0	1	<0.1
90-12	cocaine HCl nicotinamide	145	2	1	3	2.0
91-5	LSD, lygersol	157	0	1	1	0.6
91-13	heroin HCl, procaine HCl	192	0	2	2	1.0
92-5	methamphetamine, P2P, naphthalenes	167	0	0	0	0.0
92-13	methcathinone	178	15	2	17	9.5
93N	MDEA	213	3	1	4	1.8
TOTALS		2237	48	15	63	2.8

misuse of the technology and an apparent disregard for information that was gained, or could have been gained, from appropriate screening tests. Several examples of this can be cited.

Proficiency Test 85-9a consisted of tetracaine, phenylpropanolamine as well as lactose, inositol and mannitol. In this test one respondent using GC-MS identified trace amounts of cocaine in the sample. The test scheme of this respondent included a gold chloride microcrystalline test that was negative, (i.e., no crystals formed), TLC, and GC-MS after an acid-base extraction. The gold chloride test as used here would be designated as a screening test. It is very sensitive for cocaine, capable of detecting trace quantities, yet the results were negative. The identification of cocaine despite the negative gold chloride test appears to be an example of significant screening test results being more routinely dismissed because of over-confidence in state-of-the-art instrumental technology. Three other errors in this test included a test scheme in which IR was used and two testing schemes in which a combination of the less specific testing methodologies, i.e., GC and TLC, led to a mis-identification.

Proficiency Test 87-8 consisted of a powder containing MDEA and lactose. In this test, the most common error was the mis-identification of the sample as MDMA. Of the three respondents making the mis-identification, two did so using GC-MS and IR and one used IR alone.

Other errors included mis-identifications as MDA, morphine and N-ethylamphetamine. MDA and morphine were apparently identified using IR while N-ethylamphetamine was identified using GC-MS. The mass spectrum of MDEA

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TABLE 2 CTS tests and % frequency of testing methods.

CTS test	Classification tests colour	1xtal	UV	TLC	GC	Identification tests 2xtal	IR	GC-MS	Other
85-9a	81	15	54	54	49	11	56	44	9
85-9b	87	23	38	44	42	27	60	42	12
86-9	82	19	31	38	34	23	63	54	9
87-8	80	9	56	48	30	1	97	72	11
88-1	79	20	40	36	44	16	65	46	7
88-8	61	7	51	37	28	2	85	79	4
89-4	78	15	28	43	38	22	50	72	3
89-12	82	10	41	34	36	8	82	81	8
90-4	34	0	31	35	28	0	29	90	5
90-12	89	28	33	22	48	16	56	82	5
91-5	94	0	33	69	25	0	15	78	18
91-13	89	17	27	37	41	6	53	90	12
92-5	85	24	30	32	38	10	69	84	16
92-13	75	7	46	28	31	3	83	91	24
93N	74	unk	37	15	20	3	74	92	9

TABLE 3 Frequency of identification methods used in instances of errors.

CTS test	errors	2xtal	GC-MS	IR	GC-MS + IR	Other	Unknown
85-9a	4	0	1	1	0	2	0
85-9b	1	0	0	1	0	0	0
86-1	0	Methods that respondents used not reported					0
86-9	3	0	0	0	1	2	0
87-1	2	Methods that respondents used not reported					2
87-8	7	0	1	4	2	0	0
88-1	0	0	0	0	0	0	0
88-8	0	0	0	0	0	0	0
89-4	4	0	1	2	1	0	0
89-12	14	0	9	1	3	0	1
90-4	1	0	0	1	0	0	0
90-12	3	0	0	0	3	0	0
91-5	1	0	1	0	0	0	0
91-13	2	0	1	0	1	0	0
92-5	0	0	0	0	0	0	0
92-13	17	0	10	0	7	0	0
93N	4	0	2	1	1	0	0

is readily distinguished from that of MDMA; MDMA has a base peak at m/z 58 while the base peak for MDEA with its additional methyl group is at m/z 72. This discrepancy should not have been missed. The mass spectra of MDEA and N-ethylamphetamine also have significant differences. A key difference is the fragment at m/z 91 in the spectrum of N-ethylamphetamine. This fragment is relatively abundant in N-ethylamphetamine and weak to non-existent in MDEA. The confusion of MDEA and morphine by IR is inexcusable as the spectra of the two compounds are not at all similar. The IR spectra of MDA and MDEA, while similar in some respects, are also distinguishable.

Proficiency Test 89-4 consisted of cocaine base, methamphetamine HCl and nicotinamide and was notable for the methods, chosen by one of the respondents responsible for an error, to characterize the form of cocaine present. This respondent detected no methamphetamine, reported the use of IR for the identification of cocaine and a silver nitrate test for determination of the cocaine HCl form. Two points are appropriate. First and foremost, IR alone is capable of distinguishing the salt and base forms of cocaine. Proper examination and evaluation should have precluded the necessity for any other tests for distinguishing between the base and salt forms. Further, the use of a silver nitrate test for the determination of the HCl form must assume that there is no other possibility for the Cl-ion. In this case, the HCl came from the methamphetamine. Standard analytical schemes may not be adequate to the task.

Proficiency Test 89-12 consisted of a powder containing N,N-dimethyl-amphetamine and lactose. In this test, 14 of 135 respondents reported errors. Eleven of the respondents incorrectly identified the main component, most commonly reported the presence of N-ethylamphetamine or mephentermine. One of the respondents incorrectly identified the sample as N-ethylamphetamine and also reported cocaine in the sample. The primary method used for these eleven errors appeared to include GC-MS. Two other respondents reported the presence of methamphetamine in addition to the other components. One of these respondents indicated the use of GC-MS while the testing method used by the other is unknown.

The mass spectra of N,N-DMA and N-ethylamphetamine are very similar but will have different GC retention times. N,N-DMA has a small but highly characteristic fragment at m/z 162 which is absent in the spectrum of mephentermine. It is an all too common occurrence that relatively small, yet important, fragments such as the one at m/z 162 in N,N-DMA are too easily dismissed as instrumental noise. The IR spectra of N,N-DMA, N-ethylamphetamine and mephentermine are distinguishable. Essentially, those who identified N-ethylamphetamine and mephentermine ran inadequate screening tests prior to analyzing the sample by state-of-the-art technology. Such an approach is inadvisable because amines are very difficult to distinguish, even with adequate testing.

Proficiency Test 90-12 consisted of cocaine, HCl, nicotinamide and 'Coffee Mate'. The three errors reported in this test all involved the identification of cocaine base; two respondents reported cocaine base only and the third reported both the base and HCl forms. It is especially disturbing that each of these three used IR as part of their analytical scheme. Proper use of IR should have been more than enough to distinguish between the base and salt forms of cocaine.

Proficiency Test 91-5 consisted of two separate pieces of perforated blotter paper, one impregnated with LSD, the other with lygersol. Only one false positive was reported. The respondent identified trace amounts of cocaine present in the sample. Tests included colour tests, TLC in two systems and GC-MS. This appears to be a result of contamination.

Proficiency Test 92-13 consisted of methcathinone. This test had the second highest error rate of the seventeen proficiency test sets that were evaluated. Fourteen respondents incorrectly identified the sample as either ephedrine or pseudoephedrine. All of them indicated the use of GC-MS in their analytical scheme. One of the respondents also identified the presence of squalene in addition to identifying ephedrine. The mass spectra of methcathinone, pseudoephedrine, and ephedrine are similar. However, methcathinone has a significantly different retention time from that of pseudoephedrine and ephedrine and should have at least been differentiated on this leg of the GC-MS protocol. It should also be pointed out that two of the respondents mis-identifying the sample ran a Chen's test and one of these ran a UV scan. Methcathinone does not produce a positive reaction with Chen's and the UV spectrum of methcathinone is significantly different from that of pseudoephedrine and ephedrine.

The mis-identification problems on this test appear to be an example of compound unfamiliarity combined with limitations of instrumental libraries. This author analysed the 92-13 sample using GC-MS. Methcathinone was not available in our GC-MS search library and the library search produced ephedrine as the likely candidate. The possibility of the presence of ephedrine had already been precluded through an analytical scheme which included microcrystalline tests. This particular test highlights one of the supposed advantages of instrumentation, that state-of-the-art technology is necessary to identify the more unusual compounds. The library search is incapable of producing hits regarding compounds not in its database. Unless one is conversant with spectra interpretation, one is subject to the limitations of this library search. Very similar compounds can produce seemingly good search results when the actual compound is not available. Without critical evaluation of the search results, one can incorrectly identify an unusual compound. Meanwhile, more traditional tests such as microcrystalline tests can actually be as valuable as instrumental methods because they are useful for determining what the compound is not. With this information, instrumental search results can be subjected to better critical evaluation than would otherwise have been possible.

Proficiency Test 93N contained MDEA, the same target drug as test 87-8. The errors in this test were similar to those reported in test 87-8. The respondents incorrectly identified the sample as either MDMA or MDA. These mis-identifications could have been due in part to an over-reliance on search libraries because, like methcathinone, MDEA is not present in some GC-MS search libraries.

Conclusions

Two conclusions can be drawn from this review of proficiency test results. First, microcrystalline tests are no less reliable than instrumental tests. In fact, responding laboratories that depended on microcrystalline tests for the identification of the target compound made no errors. In contrast, respondents who had not used microcrystalline testing for the identification of the target compound did make errors. Second, it is apparent from a review of the analytical schemes of those respondents responsible for errors that it was not necessarily the methodology they used that was unreliable, but rather the way in which they used the methodology.

It is all too common for individuals to develop a 'black box' mentality and allow the instrument and associated computer programs to do far too much of the work. From the evaluation of the analytical schemes of respondents responsible for errors, it is apparent that errors were due to lack of critical thinking. As disturbing as the errors were, some of the interpretations by respondents placed on test findings were equally worrying. Two examples from the test on methcathinone illustrate this point. The first was made by a respondent incorrectly identifying the sample as pseudoephedrine. This respondent commented that there were indications that the sample 'was accidentally oxidized to a ketone and not reduced to methamphetamine'. The second comment was made by a respondent who correctly identified the sample. This respondent commented, 'N-methylcathinone is an oxidation product of ephedrine leading to the conclusion that the laboratory was producing methamphetamine'. Neither of these conclusions was warranted by any of the information provided in the scenarios. Statements such as these are typically associated with individuals who have 'blinders' on and are not the conclusions of individuals skilled in critical thought.

By themselves, microcrystalline tests and instrumental methods of analysis are very reliable. However, if used by an individual who is not adequately trained or does not employ the necessary critical thinking skills, the methods are no better than that individual utilizing them. These methods can be seen as a finely crafted musical instrument. The craftsman has gone to every extent possible to ensure that each particular instrument is of the finest quality, has no flaws and is properly tuned. In the hands of one skilled in its play, the results may be magnificent. In the hands of the unskilled, the results will certainly be cacophony.

References

1. Flinchbaugh D. ASTM Proficiency Test Results Confirm Laboratory Competency. ASTM Standardization News, June 1995; 47.
2. Collaborative Testing Services. Drug Proficiency Report, Test 85-9, 1985.
3. Collaborative Testing Services. Drug Proficiency Report, Test 86-1 , 1986.
4. Collaborative Testing Services. Drug Proficiency Report, Test 86-9 , 1986.
5. Collaborative Testing Services. Drug Proficiency Report, Test 87-1 , 1987.
6. Collaborative Testing Services. Drug Proficiency Report, Test 87-8 , 1987.
7. Collaborative Testing Services. Drug Proficiency Report, Test 88-1 , 1988.
8. Collaborative Testing Services. Drug Proficiency Report, Test 88-8 , 1988.
9. Collaborative Testing Services. Drug Proficiency Report, Test 89-4 , 1989.
10. Collaborative Testing Services. Drug Proficiency Report, Test 89-12, 1989.
11. Collaborative Testing Services. Drug Proficiency Report, Test 90-4, 1990.
12. Collaborative Testing Services. Drug Proficiency Report, Test 90-12, 1990.
13. Collaborative Testing Services. Drug Proficiency Report, Test 91-5, 1991.
14. Collaborative Testing Services. Drug Proficiency Report, Test 91-13, 1991.
15. Collaborative Testing Services. Drug Proficiency Report, Test 92-5, 1992.
16. Collaborative Testing Services. Drug Proficiency Report, Test 92-13, 1992.
17. Collaborative Testing Services. Drug Proficiency Report, Test 93N , 1993.

Response to the President's Council of Advisors on Science and Technology (PCAST)

Submitted by: Firearm/Toolmark Subcommittee of the National Institute of Standards and Technology (NIST) Organization of Scientific Area Committees (OSAC)

Date: December 23, 2015

Question 1: What studies have been published in the past 5 years that support the foundational aspects of each of the pattern-based forensic science methods, including (but not limited to) latent print analysis; firearms/toolmarks; shoe/tire prints; bitemark analysis; questioned documents? What studies are needed to demonstrate the reliability and validity of these methods?

The following are literature citations for studies published in the past five years that provide foundational support to the discipline of firearm and toolmark comparison. Although these citations respond specifically to this Council's focus within the last five (5) years, it should be noted that a plethora of important literature has been generated outside this time constriction, which was reported in 2011 to the Research, Development, Testing and Evaluation subcommittee on Forensic Science Interagency Working Group (RDT&E IWG).

Scientific practice demands that possible exceptions be researched and published (efforts to test or falsify), and that a large body of confirmatory evidence from training programs, experimentation, etc., will forever remain unpublished.

It is the opinion of The Firearms/Toolmarks subcommittee of the Organization of Scientific Area Committees (OSAC) that the profession and science of firearm and toolmark comparison rests on a solid scientific foundation. The citations below represent a minor selection from a much larger body of work that encompases nearly a century of research and experiential knowledge. Despite this confidence, the professional community continues to perform new research and welcomes the scientific method of vigilant and rigorous testing of the underlying principles of the discipline. New studies using three dimensional measurement instruments and comparison software have provided objective data that supports the range of conclusions used by the profession.

A short summary or abstract follows each citation.

Firearms Identification, Bullets

Intelligent Automation, Incorporated, “A Statistical Validation of the Individuality of Guns Using High Resolution Topographical Images of Bullets”, National Institute of Justice Grant #2006-DN-BX-K030, October, 2010.

This was a study of marks on fired bullets by a topography based (3D) automated system. This study continued the analysis of a previous 2005 NIJ bullet study and validated the original premise of Firearm/Toolmark ID. This study also concluded that 1) the ability to determine that a given bullet was fired from a specific barrel depends on the individual barrel itself and not only on the brand of its manufacture, and 2) the performance of the automated analysis system used in this study is not representative of that of a trained firearms examiner as humans have a remarkable ability to perform pattern matching that is difficult to be replicated in any automated system.

Fadul, T. G., “An Empirical Study to Evaluate the Repeatability and Uniqueness of Striations/Impressions Imparted on Consecutively Manufactured Glock EBIS Gun Barrels”, AFTE Journal, Volume 43, Number 1, Winter 2011, pp. 37-44.

This paper describes an empirical study of ten consecutively manufactured Glock barrels containing the Enhanced Bullet Identification System (EBIS). Study consisted of test sets sent to 238 examiners from 150 laboratories in 44 states and 9 countries that were designed to test the examiner’s ability to correctly identify fired bullets to the barrel that fired them. The results from 183 of these examiners produced an error rate of 0.4%. This study validated the repeatability and uniqueness of striated markings in gun barrels, as well as the ability of a competent examiner to reliably identify fired bullets to the barrels that marked them.

Mikko, D., et al., “Reproducibility of Toolmarks on 20,000 Bullets fired through an M240 Machine Gun Barrel”, AFTE Journal, Volume 44, Number 3, Summer 2012, pp. 248-253.

This article discusses the reproducibility of toolmarks on 7.62mm high velocity bullets fired through a single M240 machine gun barrel. Over the years, there have been several research studies and published articles pertaining to consecutively manufactured rifled barrels and the ability to microscopically identify bullets as having been fired through the same barrel of a firearm; however, to the knowledge of the authors, there has not been any in-depth microscopic study pertaining to 20,000 bullets being fired through a single rifled barrel and subsequently identified to that particular barrel. This study was designed to provide credible evidence in regards to the reproducibility and uniqueness of striations on the bearing surfaces of fired bullets. Despite changes to the reproducibility of some of the individual markings over the course of the study, the authors were able to correctly identify the barrel of origin for each of the collected fired bullets. See subsequent related article:

Mikko, D. and Miller, J., "An Empirical Study/Validation Test Pertaining to the Reproducibility of Toolmarks on 20,000 Bullets Fired Through M240 Machine Gun Barrels", AFTE Journal, Volume 45, Number 3, Summer 2013, pp. 290-291.

Chu, et al., "Automatic Identification of Bullet Signatures Based on Consecutive Matching Striae (CMS) Criteria", Forensic Science International, Volume 231, 2013, pp. 137-141.

This paper described a study of fired bullet markings from ten consecutively manufactured firearm barrels by an automated 3D signature analytic method. This study used 3D topography image capture technology with acquisitions that were cross-correlated to existing firearm Consecutive Matching Striae (CMS) identification criteria. Results provided a fairly objective test that demonstrated support for these firearm CMS criteria.

Monkres, J, et al., "Comparison and Statistical Analysis of Land Impressions from Consecutively Rifled Barrels", AFTE Journal, Volume 45, Number 1, Winter 2013, pp. 3-20.

The validity and reliability of firearm and toolmark analysis has been debated, often revolving around the subjectivity of the methods examiners use. This study attempts to evaluate examiners' conclusions through objective computer analysis. Bullets, knowns and unknowns, fired through ten consecutively rifled barrels were used for the study. Unknown bullets were identified to the barrels from which they had been fired using traditional comparison techniques. Each land impression (LI) was photographed, and the distances of the prominent striae to one shoulder of the LI were measured using computer software. Two methods of selecting measurable striae were used. The data from these measurements was then converted into a barcode representative of the LI from which it was taken. Barcodes were subjected to Principle Component Analysis (PCA), and a Support Vector Machine (SVM) was employed to evaluate the computer's ability to correctly identify which LI was represented by the barcode, based on SVM analysis error rate (ideal error rate =5%). Optimal error rate varied based on selection technique, with 19.444% and 1.149% being the optimal values obtained by each method. The second result, generated by the majority of bullets analyzed, indicated the computer was able to adequately group barcodes according to their common origins, supporting the examiner's identifications. This research and described methodology may provide support for the reliability of firearm and toolmark analysis.

Wong, C., "The Inter-Comparison of 1,000 Consecutively-Fired 9mm Luger Bullets and Cartridge Cases from a Ruger P89 Pistol Utilizing both Pattern Matching and Quantitative Consecutive Matching Striae as Criteria for Identification", AFTE Journal, Volume 45, Number 3, Summer 2013, pp. 267-272.

Previous studies have investigated the effect of consecutive firing of firearms to determine how the wear on barrels and breechfaces would affect the identification of fired bullets and cartridge cases. This study was conducted to determine if the toolmarks on fired bullets and cartridge cases would change significantly after firing 1,000 cartridges through a Ruger P89 9mm Luger semiautomatic pistol, while using both pattern matching and quantitative consecutively matching striae (QCMS) as identification criteria during the comparison process. While there were some differences between the toolmarks on the bullets and cartridge cases throughout the firing sequence, each bullet and cartridge case was successfully identified to the first bullet or cartridge case.

Mikko, D. and Miller, J., “An Empirical Study/Validation Test Pertaining to the Reproducibility of Toolmarks on 20,000 Bullets Fired Through M240 Machine Gun Barrels”, AFTE Journal, Volume 45, Number 3, Summer 2013, pp. 290-291.

This article is a follow-up to an article that was published in the AFTE Journal-Volume 44, Number 3-Summer 2012, titled “Reproducibility of Toolmarks on 20,000 Bullets fired through an M240 Machine Gun Barrel”. Using a second M240 Machine gun with its original barrel, along with a new spare barrel assembly, thirty (30) additional bullets were test fired through both barrels and subsequently inter-compared blindly by four firearm and toolmark examiners, one of which had just completed his formal two-year training period. Additionally, the recovered (60) test fired bullets from both barrels were also mixed with the 127 bullets recovered during the test firing of 20,000 bullets in the reproducibility study and examined by the four firearm and toolmark examiners in a blind test study, in order to determine whether or not the examiners could correctly identify or eliminate the bullets as being fired through the correct barrel. A total of 164 questioned fired bullets were examined, which resulted in 164 correct answers from the participants in the study (zero percent error rate).

Rahm, J., “Evaluation of an electronic comparison system and implementation of a quantitative effectiveness criterion”, Forensic Science International, Volume 214, 2012, pp 173–177.

The basis of an expansive database and electronic comparison system (Evofinder) used by the BKA in Germany is evaluated and a mathematical value is proposed to rate the correlation quality. This effectiveness criterion can be valuable to give an objective assessment of different electronic comparison systems. Additionally, the applicability of the system on different calibres and land engraved area (LEA) width is discussed. The so called scores are also on disposition and their benefit to a decision-making is debated. The article also shows results for cartridge cases.

Firearms Identification, Cartridge Cases

LaPorte, D., "An Empirical Validation Study of Breechface Marks on .380 ACP Caliber Cartridge Cases Fired from Ten Consecutively Finished Hi-Point Model C9 Pistols", AFTE Journal, Volume 43, Number 4, Fall 2011.

An empirical study was conducted using ten (10) consecutively finished Hi-Point model C9 slides and one frame acquired from the Hi-Point Manufacturing Company in Mansfield, Ohio. The ten (10) slides were mounted on the frame and test fired to obtain cartridge cases for comparison. The test fired cartridge cases were microscopically examined, evaluated and compared for class and individual characteristics that resulted from the manufacturing process. Prominent striations were evident on each test-fired cartridge case. These resulted from sanding of the breech face. The variations that occur during the manufacturing process of sanding result in unique, identifiable, individual breech face marks devoid of subclass influence. A limited validation study was conducted after the empirical study. Correct associations were made during this limited study.

Thompson, R., Song J., Zheng A., and Yen J., "Cartridge Case Signature Identification Using Topography Measurements and Correlations: Unification of Microscopy and Objective Statistical Methods", National Institute of Standards and Technology, Presented at the 18th European Network of Forensic Science Institutes (ENFSI) Conference, Lisbon, Portugal, October, 2011.

A comparison microscope employing the standard optical comparison method and confocal microscopy, with subsequent cross-correlation topography analysis, were used to correctly identify cartridge cases fired from ten consecutively made pistol slides.

Subsequent cross correlation function analysis and statistical analysis of match and non-match scores correctly identified the fired cartridge cases back to their respective known slide source in 19 of 20 occasions with one inconclusive result. Results of the mathematical determination of slide source were compared to the validated results from the microscopic comparisons.

Petraco, D. K., et al., "Application of Machine Learning to Toolmarks: Statistically Based Methods for Impression Pattern Comparisons", NIJ/NCJRS Document #239048, Award #2009-DN-BX-K041, July 2012.

This was a statistical study that evaluated 3D quantitative surface topographies of toolmarks, consisting of fired cartridge cases, screwdriver and chisel striations, generated using confocal microscopy. Principal component and canonical variate analysis, as well as support vector machine methodology, was used to objectively associate these toolmarks with the tools that produced them. Estimated toolmark identification error rates were approximately 1% using these algorithmic methods. The findings of this objective and quantitative scientific research support the general conclusions codified in the AFTE Theory of Identification.

Mayland, B., and Tucker, C., "Validation of Obturation Marks in Consecutively Reamed Chambers", AFTE Journal, Volume 44, Number 2, Spring, 2012, pp. 167-169.

This study of fired cartridge cases from ten consecutively manufactured firearms was conducted to determine the reproducibility and reliability of obturation marks from reamed chambers for identification purposes. Results of this empirical study, which consisted of sixty-four (64) participants from nineteen (19) national laboratory systems, effected a sensitivity rating of 0.927.

These results demonstrate that obturation markings imparted on fired cartridge cases can be used as a reliable means of identification to the firearm that marked them.

Stowe, A., "The Persistence of Chamber Marks from Two Semiautomatic Pistols on Over 1,440 Sequentially-Fired Cartridge Cases", AFTE Journal, Volume 44, Number 4, Fall 2012, pp. 293-308.

A Browning Hi-Power semiautomatic pistol and a Hi-Point model C semiautomatic pistol were test fired a total of 1,440 times each, and the chamber marks imparted to the fired cartridge cases were examined. Ammunition used included cartridges with cases made of aluminum, brass, and nickel-plated brass. Microscopic comparison of the chamber marks revealed that they were reproducible and identifiable up to 960 firings and that the metallic composition of the cartridge case does affect the reproducibility of the chamber marks.

Grom, T. L., "IBIS Correlation Results of Cartridge Cases Collected Over the Course of 500 Firings from a Glock Pistol", AFTE Journal, Volume 44, Number 4, Fall 2012, pp. 361-363.

This study examines the capability of the IBIS system to find known matching fired cartridge cases that have been produced after the moderate use of a Glock firearm. A total of 500 cartridges were fired from a Glock pistol. The individual characteristics of the breech face and firing pin persisted throughout the firings, and IBIS was able to properly correlate the known match within the top twenty results for each cartridge case entered.

Weller, T. J., et al., "Confocal Microscopy Analysis of Breech Face Marks on Fired Cartridge Cases from 10 Consecutively Manufactured Pistol Slides", Journal of Forensic Sciences, Volume 57, Number 4, July 2012, pp. 912-917.

This was a study of 90 test fired cartridge case specimens from ten consecutively manufactured pistol slides. A total of 8010 comparisons were conducted by using confocal microscopy with a 3D cross-correlation analysis logarithm. The average match scores were 0.82 with the average non-match scores 0.20. There was no overlap of scores between matching and non-matching test scores. This study provided objective data that supports the AFTE Theory of Identification.

Cazes, M. and Goudeau, J., “Validation Study Results from Hi-Point Consecutively Manufactured Slides”, AFTE Journal, Volume 45, Number 2, Spring 2013, pp. 175-177.

This study was designed to determine whether trained firearm and tool mark examiners could identify eight unknown fired cartridge cases to one of five consecutively manufactured 9mm Hi-Point model C-9 pistol slides. The five slides were used to create a total of twenty-six (26) test sets, each containing a known/control set and an unknown set of fired cartridge cases. The participants were informed that the firing pin impressions, extractor marks, and ejector marks should not be used for identifying purposes, as the frame of the firearm (including the firing pin) was the same for all test sets. A total of sixty-nine (69) responses were received from participants that took part in the study. Over three-fourths of the participants used the technique of pattern matching only to complete this study, while the remainder used both pattern matching and consecutive matching striae (CMS). All of the participants reported correct results. There were no inconclusive responses and no incorrect responses validating the hypothesis that firearms examiners could differentiate between consecutively manufactured Hi-Point slides.

Fadul, T., et al., “An Empirical Study to Improve the Scientific Foundation of Forensic Firearm and Tool Mark Identification Utilizing Ten (10) Consecutively Manufactured Slides”, AFTE Journal, Vol. 45, Number 4, Fall 2013, pp. 376-389.

This was an empirical study of marks produced from 10 consecutively Ruger brand manufactured pistol slides by 217 firearm examiners from 46 states and the District of Columbia. Results of this study established an error rate of less than 0.1%, and validated toolmark durability as these slides maintained their individual signature after multiple firings.

Yong, J., et al., “Further Investigations into the Permanence of Breechface Recess and Other Marks on Cartridge Cases Discharged from 9mm Calibre Walther P99 Pistols”, AFTE Journal, Volume 46, Number 2, Spring 2014, pp. 138-142.

This report describes the permanence of the toolmarks on cartridge cases discharged from 9 mm calibre Walther P99 pistols. Three weapons that were subjected to extensive firing in the years 2010 and 2012 were used for the study. The cartridge cases expended from the firearms in these two years were examined in order to verify whether the marks on them have been persistent. Results have shown that breechface recess marks, firing pin impression and firing pin aperture shear marks showed reproducibility. In addition, all the marks above except the breechface impression held sufficient individual characteristics for identification. Thus, the identity of the weapon from the expended cartridge cases from Walther P99 pistols after extensive firing could be determined. Significantly, the breechface recess marks presented themselves in all the three weapons as useful for comparison.

Stroman, A., "Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double-Blind Format", AFTE Journal, Volume 46, Number 2, Spring 2014, pp. 157-175.

This paper describes a no-gun empirical study of fired cartridge cases to determine the frequency of error in firearms identification using a declared double-blind testing format; i.e., a declared test containing blind elements. Seventy-four of seventy-five examiners accurately identified the questioned fired cartridge cases to the respective known specimens with no false positives. This study also demonstrated that examiners were able to accurately evaluate breechface markings avoiding mis-identifications from substantial subclass marks borne by the cartridge cases.

Baldwin, D.P., et al., "A Study of False-Positive and False-Negative Error Rates in Cartridge Case Comparisons", USDOE Technical Report # IS-5207 (April 7, 2014)

This report provides the details for a study designed to measure examiner error rates for false identifications and false eliminations when comparing an unknown to a collection of three known cartridge cases. Volunteer active examiners were provided with 15 sets of 3 known + 1 unknown cartridge cases fired from a collection of 25 new Ruger SR9 handguns. The ammunition was all Remington 9-mm Luger. Responses were received from 218 participating examiners. The rate of false negatives was estimated as 0.367%. The overall rate of false positives was estimated as 1.01%. However, most of the errors were reported by a small number of examiners; that is, individual examiners have varying error rates. Laboratory error rates may be significantly lower than these individual rates if quality assurance procedures are applied that can effectively reduce or eliminate the propagation of false positives reported by individuals.

Song, J., "Proposed 'Congruent Matching Cells (CMC)' Method for Ballistic Identification and Error Rate Estimation," AFTE Journal, Volume 47, Number 3, Summer 2015, pp177-185

Based on the concept of correlation cells, a Congruent Matching Cells (CMC) method is proposed for ballistic identification and error rate estimation using three sets characteristic parameters of the paired correlation cells: cross correlation function maximum CCFmax, spatial registration positions in x-y and registration phase angle θ. The proposed CMC method can be used for correlation of both geometrical topographies and optical images. The CMC parameters and algorithms are in the public domain and subject to open tests. Based on the CMC method, an error rate procedure for ballistic identifications is described, which uses binomial distributions to model correlation results for both matching and non-matching image pairs.

Chu, Tong and Song, "Validation Tests for the Congruent Matching Cells (CMC) Method Using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides", AFTE Journal, Volume 45, Number 4, Fall 2013, pp. 361-366.

This was a study of ten (10) consecutively manufactured slides using 3D topography technology with correlations of paired breech marking correlation cells to establish firearm identifications. Test results showed significant separation between KM and KNM distributions without any false positive or false negative identification.

Firearm and Toolmark Identification Theoretical

Wevers G., et al., "A Comprehensive Statistical Analysis of Striated Tool Mark Examinations; Part 2: Comparing Known Matches and Known Non-Matches using Likelihood Ratios". AFTE Journal, Volume 43, Number 2, Summer 2011, pp. 137-145.

In this article, a potential model for increasing the objectivity in the interpretation of toolmarks was explored using consecutively matching striae (CMS) and Bayesian inference. Given the nature of the data, standard statistical thinking suggests that Bayesian inference is likely to be the most powerful method of interpretation. The unavoidable paucity of data for high CMS runs for the known non-match condition was handled using a small advance in modelling. The resulting likelihood ratios showed some, but incomplete, separation between the known match and known non-match conditions. Although promising, the resulting incomplete separation between known matches and known non-matches was thought to represent limitations of the CMS summary of the complete pattern and limitations of the modelling used.

Petraco, D. K., et al., "Addressing the National Academy of Sciences' Challenge: A Method for Statistical Pattern Comparison of Striated Tool Marks", Journal of Forensic Sciences, Volume 57, Number 4, July 2012, pp. 900-911.

Toolmark test specimens from nine slotted screwdrivers were encoded into high-dimensional feature vectors and analyzed by multiple statistical pattern recognition methods. The statistical methods used, which are widely known and accepted in academic applications, rely on few assumptions of the data's underlying distribution, can be accompanied by standard confidence levels, and are falsifiable. Correct classification rates of at least 97% were achieved.

Bunch, S. and Wevers, G., "Application of likelihood ratios for firearm and toolmark analysis"; Science and Justice, Volume 53, Issue 2, June 2013, pp. 223-229.

Historically firearm and toolmark examiners have rendered categorical or inconclusive opinions and eschewed probabilistic ones, especially in the United States. The authors of this article suggest this practice may no longer be necessary or desirable, and outline an alternative approach that is within a comprehensive logical/Bayesian paradigm. Hypothetical forensic and non-forensic examples are provided for readers who are practicing firearm and toolmark examiners, and the strengths and weaknesses of both approaches are considered.

Kerkhoff, W. , et al., The Likelihood Ratio Approach in Cartridge Case and Bullet Comparison," AFTE Journal, Volume 45, Number 3, Summer 2013, pp 284-289

This article summarizes the different aspects of the discussion that led to the implementation of the likelihood ratio approach to firearms identification by the Firearms Section of the Netherlands Forensic Institute (NFI). The authors' (three firearms examiners and a statistician) perspectives on the use of this approach in cartridge case and bullet comparison are shared.

Toolmark Identification

Bachrach B., Jain A., Jung S., Koons R.D., "A Statistical Validation of the Individuality and Repeatability of Striate Tool Marks: Screwdrivers and Tongue and Groove Pliers", Journal of Forensic Sciences, Volume 55, Number 2, March 2010, pp. 348-357.

This study statistically validated the original premise of individuality in Toolmark Identification by analyzing statistical distributions of similar values resulting from the comparison of Known Matches (KM) and Known Non-Matched (KNM) pairs of striated toolmarks. This quantifiable analysis of KM and KNM toolmark similarity distributions showed nearly error-free identifications.

Chumbly, L. S., et al., "Validation of Tool Mark Comparisons Obtained Using a Quantitative, Comparative, Statistical Algorithm" Journal of Forensic Sciences, Volume 55, Number 4, July 2010, pp. 953-961.

A statistical analysis and computational algorithm for comparing pairs of toolmarks by profilometry data was conducted. Toolmarks produced by 50 sequentially made screwdrivers, at selected fixed angles, were analyzed both empirically (by practicing examiners) and by established computational algorithms. The results of these comparisons, as well as a subsequent blind study with the participating examiners, showed scores of good agreement between the algorithm and human experts. It was also noted that in some of the examination phases, examiner performance was much better than the algorithm.

Petraco, N.D.K., et al, "Estimation of Striation Pattern Identification Error Rates by Algorithmic Methods, AFTE Journal, Volume 45, Number 3, Summer 2013, pp. 235-244.

This was a computational study that used algorithmic methods of toolmark striation patterns produced by screwdriver tips and firearm firing pin apertures in determining error rates.

Multivariate analysis, as well as support vector machine methodology, was used to objectively associate these toolmarks with the tools that produced them. Estimated toolmark identification error rates were approximately 1% using these algorithmic methods. The findings of this objective and quantitative scientific research support the general conclusions codified in the AFTE Theory of Identification.

Zheng, X.A., et al, "2D and 3D Topography Comparisons of Toolmarks Produced from Consecutively Manufactured Chisels and Punches", AFTE Journal, Volume 46, Number 2, Spring 2014, pp. 143-147.

This paper described an automated blind study of toolmarks from consecutively made chisel and punches utilizing 2D and 3D topography analysis. hese analytical comparative results were expressed as a maximum value of the normalized Cross Correlation Function (CCF). Based on the CCF metric, all of the toolmarks were correctly identified to the tool that produced them. This study provides additional objective scientific support for the validity of Toolmark Identification.

Ekstrand, et al, "Virtual Tool Mark Generation for Efficient Striation Analysis", Journal of Forensic Sciences, Volume 59, Number 4, July 2014, pp. 950-959.

This was a follow-up study on Zhang and Chumbley's research (See Emerging Research Section) regarding the development of virtual toolmarks by a 3-D computer simulation that would allow for the development of highly predictable toolmark characterizations. The initial study involved the production of test toolmarks by six screwdriver tips that were then compared by a previously developed statistical algorithm.

Preliminary experimental results indicate that the use of a manipulative, virtual tool could provide quantitative data for the characterization of tool marked surfaces that would improve the scientific basis of toolmark identification. These results support the present theory and conclusions held in Toolmark Identification.

King, E., "Validation Study of Computer Numerical Control (CNC), Consecutively Manufactured Screwdrivers", AFTE Journal, Volume 47, Number 3, Summer 2015, pp. 171-176.

The purpose of this study was to perform a validation study to determine if screwdrivers that are consecutively manufactured using the computer numerical control (CNC) process can be identified by trained forensic examiners after having their class characteristics reproduced by striated toolmark samples. The results were based on participation from seven members of the Scientific Working Group for Firearms and Toolmarks (SWGGUN) and yielded an error rate of 0.00%. This result provides support of toolmark identification in the scientific community, thus complying with the Daubert standard. These results further demonstrate the CNC consecutive-manufacturing process did not eliminate the individual or class characteristics of the screwdrivers and does not interfere with the ability of examiners to correctly associate tools and the marks they leave on working surfaces.

M. Baiker, et al., Quantitative comparison of striated toolmarks, Forensic Science International Volume 242, 2014, pp 186–199.

In this study, an automated method was presented for objective comparison of striated marks of screwdrivers. The combination of multi-scale registration (alignment) of toolmarks, that accounts for shift and scaling, with global cross-correlation as objective toolmark similarity metric renders the approach robust with respect to large differences in angle of attack and moderate toolmark compression. The performance of the method was evaluated using 3D topography scans of experimental toolmarks of 50 unused screwdrivers. Known match and known non-match similarity distributions are estimated including a large range of angles of attack (15, 30, 45, 60 and 75) for the known matches. It was demonstrated that the system has high discriminatory power, even if the toolmarks are made at a difference in angle of attack of larger than 15 degrees. The probability distributions were subsequently employed to determine likelihood ratios.

Fracture matching

Claytor D., "Validation of Fracture Matching Through the Microscopic Examination of the Fractured Surfaces of Hacksaw Blades", AFTE Journal, Volume 42, Number 4, Fall 2010, pp. 323-334.

This study was a validation of a fracture matching method utilizing two consecutively-manufactured hacksaw blades fractured eleven times and inter-compared. Two hundred fifty-three (253) topical comparisons were conducted between forty-four (44) fractured edges. Additional fractured hacksaw blade test specimens were produced and sent to examiners around the world yielding three hundred-thirty (330) test results.

Emerging Research

Bolton-King, R., et al., "What are the Prospects of 3D Profiling Systems Applied to Firearms and Toolmark Identification?," AFTE Journal, Volume 42, Number 1, Winter 2010, pp. 23-33.

This paper details a comparative pilot study of 3D (three dimensional) imaging technologies for potential application in forensic firearms and toolmark identification; as such it reviews the most up-to-date profiling systems. In particular, the paper focuses on the application of 3D imaging and recording technology as applied to firearm identification, being a specialised field within the discipline of toolmark identification. Each technology under test employs a different technique or scientific principle to capture topographic data i.e. focus-variation microscopy, confocal microscopy, point laser profilometry and vertical scanning interferometry. To qualitatively establish the capabilities and limitations of each technology investigated, standard reference samples were used and a set of specific operational criteria devised for successful application in this field. The reference standard crucially included and centred on was the National Institute of Standards and Technology (NIST) 'standard bullet'. This was to ensure that evaluation represented the practical examination of ballistic samples i.e. fired cartridge cases and bullets. It is concluded that focus-variation microscopy has potentially the most promising approach for a forensic laboratory instrument, in terms of functionality and 3D imaging performance, and is worthy of further investigation.

Chu, W., et al., "Selecting Valid Correlation Areas for Automated Bullet Identification System Based on Striation Detection", Journal of Research of the National Institute of Standards and Technology, Volume 116, Number 3, May-June 2011.

This paper detailed a study on fired bullet markings using automated bullet identification systems that employ an edge detection algorithm and selection process that locates the edge points of significant toolmark features was conducted. Results of this study validated the differentiation ability of individual characteristics if a proper striation threshold length could be established.

Gambino, C., et al., "Forensic Surface Metrology: Tool Mark Evidence," Scanning, Volume 33, 2011, pp. 272–278.

Over the last several decades, forensic examiners of impression evidence have come under scrutiny in the courtroom due to analysis methods that rely heavily on subjective morphological comparisons. Currently, there is no universally accepted system that generates numerical data to independently corroborate visual comparisons. This research attempted to develop such a system for tool mark evidence, proposing a methodology that objectively evaluates the association of striated tool marks with the tools that generated them. In this study, 58 primer shear marks on 9 mm cartridge cases, fired from four Glock model 19 pistols, were collected using high-resolution white light confocal microscopy. The resulting three-dimensional surface topographies were filtered to extract all "waviness surfaces"-the essential "line" information that firearm and toolmark examiners view under a microscope. Extracted waviness profiles were processed with principal component analysis (PCA) for dimension reduction. Support vector machines (SVM) were used to make the profile-gun associations, and conformal prediction theory (CPT) for establishing confidence levels. At the 95% confidence level, CPT coupled with PCA-SVM yielded an empirical error rate of 3.5%. Complementary, bootstrap-based computations for estimated error rates were 0%, indicating that the error rate for the algorithmic procedure is likely to remain low on larger data sets. Finally, suggestions were made for practical courtroom application of CPT for assigning levels of confidence to SVM identifications of tool marks recorded with confocal microscopy.

Song, J., et al., "Development of Ballistics Identification- from Image Comparison to Topography Measurement in Surface Metrology", Measurement Science and Technology, Volume 23, Number 054010, March, 2012.

This was a systematic study of direct measurement and correlation of surface topography on fired bullet markings. Based on this on this system, a prototype for bullet signature measurement and correlation was developed that has demonstrated superior correlation results for bullet signature identifications.

Yammen, S., and Muneesawang, P., "Cartridge Case Image Matching Using Effective Correlation Area Based Method," Forensic Science International, Volume 229, 2013, pp. 27-42.

A firearm leaves a unique impression on fired cartridge cases. The cross-correlation function plays an important role in matching the characteristic features on the cartridge case found at the crime scene with a specific firearm, for accurate firearm identification. This paper proposed that the computational forensic techniques of alignment and effective correlation area-based approaches to image matching are essential to firearm identification. Specifically, the reference and the corresponding cartridge cases are aligned according to the phase-correlation criterion on the transform domain. The informative segments of the breech face marks are identified by a cross-covariance coefficient using the coefficient value in a window located locally in the image space. The segments are then passed to the measurement of edge density for computing effective correlation areas. Experimental results on a new dataset show that the correlation system can make use of the best properties of alignment and effective correlation area-based approaches, and can attain significant improvement of image-correlation results, compared with the traditional image-matching methods for firearm identification, which employ cartridge case samples. An analysis of image-alignment score matrices suggests that all translation and scaling parameters are estimated correctly, and contribute to the successful extraction of effective correlation areas. It was found that the proposed method has a high discriminant power, compared with the conventional correlator. This paper advocates that this method will enable forensic science to compile a large-scale image database to perform correlation of cartridge case bases, in order to identify firearms that involve pairwise alignments and comparisons.

Zhang, S. and Chumbley, L.S., “Manipulative Virtual Tools for Tool Mark Characterization”, NCJRS Document #241443, Award # 2009-DN-R-119, March 2013.

Research on the development of virtual toolmarks by a 3-D computer simulation that would allow for the development of highly predictable toolmark characterizations. The initial study involved the production of test toolmarks by six screwdriver tips that were then compared by a previously developed statistical algorithm. Preliminary experimental results indicate that the use of a manipulative, virtual tool could provide quantitative data for the characterization of tool marked surfaces that would improve the scientific basis of toolmark identification.

Grieve, T. et al, “Objective Comparison of Toolmarks from the Cutting Surfaces of Slip-Joint Pliers” AFTE Journal, Volume 46, Number 2, Spring 2014, pp. 176-185.

In this paper, experimental results from a statistical analysis algorithm for objectively comparing toolmarks via data files obtained using optical profilometry data were described. The algorithm employed has successfully been used to compare striated marks produced by screwdrivers. In this study, quasi-striated marks produced by the cutting surfaces of slip-joint pliers were examined. Marks were made by cutting both copper and lead wire. Data files were obtained using an optical profilometer that uses focus variation to determine surface roughness. Early efforts using the comparative algorithm yielded inconclusive results when the comparison parameters used were the same as those employed successfully for screwdriver marks. Further experiments showed that the algorithm could successfully be used to separate known matches from non-matches by changing the comparison parameters. Results are presented from the analysis of the copper wires.

Riva, F. and Champod C., “Automatic Comparison and Evaluation of Impressions Left by a Firearm on Fired Cartridge Cases”, Journal of Forensic Sciences, Volume 59, Number 3, May 2014, pp. 637-647.

This paper reported on an automated study of marks contained on fired cartridge cases from seventy-nine (79) 9mm Luger caliber pistols were conducted using 3D surface topography analysis and coupled to a bivariate evaluative model to assign likelihood ratios. The purpose of this analytic system was to conduct an objective comparative analysis with a robust statistical evaluation basis to the results. The system reflected a very high discriminating ability between the known and non-known specimens. This study also reflected very low rates of misleading evidence depending on the firearm considered.

McClarin, D., “Adding an Objective Component to Routine Casework: Use of Confocal Microscopy for the Analysis of 9mm Caliber Bullets”, AFTE Journal, Volume 47, Number 3, Summer 2015, pp. 161-170.

The Alabama Department of Forensic Sciences (ADFS) procured a confocal microscope for the purpose of incorporating three-dimensional (3D) topographical analysis into routine casework. The purpose of employing such a technique was to assist the firearm and toolmark examiner by complementing routine analysis with an independent objective analysis. This article covered the research procedures conducted using confocal microscopy at the ADFS.

Weller, T., et al., "Introduction and Initial Evaluation of a Novel Three-Dimensional Imaging and Analysis System for Firearm Forensics" AFTE Journal, Volume 47, Number 4, Fall 2015, pp. 198-208.

This paper presents a set of matching experiments conducted using a novel 3D imaging and analysis system for cartridge cases, TopMatch. The system utilizes the GelSight photometric stereo sensor to measure micron scale surface geometry and a novel feature-based matching algorithm to score the geometric similarity between measured surfaces. The matching algorithm separately considers the impressed breech face impression and the striated aperture shear and then combines their similarity into a single confidence score. The system demonstrates excellent recall rates with no false positives across a set of experiments involving 290 firearms and 700 cartridge cases from 24 firearms manufacturers. This was the first publication describing this new technology and the first round of matching results. Improvements to the imaging and matching algorithms are already underway.

Spotts, R., et al., "Angular Determination of Toolmarks Using a Computer-Generated Virtual Tool" Journal of Forensic Sciences, Volume 60, Number 4, July 2015, pp. 878-884.

A blind study was conducted to determine whether virtual toolmarks created using a computer could be used to identify and characterize angle of incidence of physical toolmarks. Six sequentially manufactured screwdriver tips and one random screwdriver were used to create toolmarks at various angles. An apparatus controlled the tool angle. Resultant toolmarks were randomly coded and sent to the researchers, who scanned both tips and toolmarks using an optical profilometer to obtain 3D topography data. Developed software was used to create virtual marks based on the tool topography data. Virtual marks generated at angles from 30 to 85° (5° increments) were compared to physical toolmarks using a statistical algorithm. Twenty of twenty toolmarks were correctly identified by the algorithm. On average, the algorithm misidentified the correct angle of incidence by −6.12°. This study presents the results, their significance, and offers reasons for the average angular misidentification.

Hamby, J., et al., "Evaluation of GLOCK 9mm Firing Pin Aperture Shear Mark Individuality Based On 1,632 Different Pistols by Traditional Pattern Matching and IBIS Pattern Recognition" Journal of Forensic Sciences, DOI:10.1111/1556-4029.12940, (In Press) 2015.

Over a period of 21 years, a number of fired GLOCK cartridge cases have been evaluated. A total of 1,632 GLOCK firearms were used to generate a sample of the same size. Our research hypothesis was that no cartridge cases fired from different 9-mm semiautomatic GLOCK pistols would be mistaken as coming from the same gun. Using optical comparison microscopy, two separate experiments were carried out to test this hypothesis. A subsample of 617 test-fired cases were subjected to algorithmic comparison by the Integrated Ballistics Identification System (IBIS). The second experiment subjected the full set of 1632 cases to manual comparisons using traditional pattern matching. None of the cartridge cases were "matched" by either of these two experiments. Using these empirical findings, an established Bayesian probability model was used to estimate the chance that a 9-mm cartridge case, fired from a GLOCK, could be mistaken as coming from the same firearm when in fact it did not (i.e., the random match probability).

Spotts, R. and Chumbley, L. S. (2015), Objective Analysis of Impressed Chisel Toolmarks. J Forensic Sci, 60: 1436–1440. doi:10.1111/1556-4029.12863

Historical and recent challenges to the practice of comparative forensic examination have created a driving force for the formation of objective methods for toolmark identification. In this study, fifty sequentially manufactured chisels were used to create impression toolmarks in lead (500 toolmarks total). An algorithm previously used to statistically separate known matching and nonmatching striated screwdriver marks and quasi-striated plier marks was used to evaluate the chisel marks. Impression toolmarks, a more complex form of toolmark, pose a more difficult test for the algorithm that was originally designed for striated toolmarks. Results show in this instance that the algorithm can separate matching and nonmatching impression marks, providing further validation of the assumption that toolmarks are identifiably unique.

Reviews

Gerules, G. , et al., “A survey of image processing techniques and statistics for ballistic specimens in forensic science,” Science and Justice, Volume 53,2013, 236–250

This paper provides a review of recent investigations on the image processing techniques used to match spent bullets and cartridge cases. It is also, to a lesser extent, a review of the statistical methods that are used to judge the uniqueness of fired bullets and spent cartridge cases. The authors reviewed 2D and 3D imaging techniques as well as many of the algorithms used to match these images. They also provided a discussion of the strengths and weaknesses of these methods for both image matching and statistical uniqueness. The goal of this paper was to be a reference for investigators and scientists working in this field.

Vorburger, T.V. , J. Song, and N. Petraco, "Topography measurements and applications in ballistics and tool mark identifications" Surface Topography: Metrology and Properties, Vol. 4, No. 1, 2015.

The application of surface topography measurement methods to the field of firearm and toolmark analysis is fairly new. The field has been boosted by the development of a number of competing optical methods, which has improved the speed and accuracy of surface topography acquisitions. The authors describe some of these measurement methods as well as several analytical methods for assessing similarities and differences among pairs of surfaces. They also provide a few examples of research results to identify cartridge cases originating from the same firearm or tool marks produced by the same tool. Physical standards and issues of traceability are also discussed.

Aitken, C., et al. *Communicating and Interpreting Statistical Evidence in the Administration of Criminal Justice, Part 1., Fundamentals of Probability and Statistical Evidence in Criminal Proceedings*, Royal Statistical Society, 2010, 121p.

Statistical evidence and probabilistic reasoning today play an important and expanding role in criminal investigations, prosecutions and trials, not least in relation to forensic evidence (including DNA) produced by expert witnesses. Guide No 1 was designed as a general introduction to the role of probability and statistics in criminal proceedings, a kind of vade mecum for the perplexed forensic traveller; or possibly, 'Everything you ever wanted to know about probability in criminal litigation but were too afraid to ask'. It explains basic terminology and concepts, illustrates various forensic applications of probability, and draws attention to common reasoning errors ('traps for the unwary').

Question 2: Have studies been conducted to establish baseline frequencies of characteristics or features used in these pattern-based matching techniques? If not, how might such studies be conducted? What publicly accessible databases exist that could support such studies? What closed databases exist? Where such databases exist, how are they controlled and curated? If studies have not been conducted, what conclusions can and cannot be stated about the relationship between the crime scene evidence and a known suspect or tool (e.g., firearm)?

Creating baseline frequency studies is a difficult proposition in the field of Firearms and Toolmarks Examination due to the dynamic nature this type of evidence presents. Given there can be no degree of control over the absence or presence of affected surface areas that may contain baseline marks makes the use of a standard frequency database difficult. However, in recent years research has been and continues to be conducted using computer technology to begin formulating criteria and to assist in creating objective, measurable standards for identification within the field.

There are published papers and books examining the relative frequency of toolmark evidence (Question # 2 References, #'s 1-11). These studies concluded the chance of a coincidental match to be low, and that a high degree of similarity between two toolmarks provides a strong basis for a conclusion of common origin. These studies remain theoretical in nature and are not applied to toolmark casework in the forensic laboratory. There are a large number of random and changing factors in tool (and firearm) manufacturing. Therefore the goal of producing a statistical model or mathematical equation that can accurately predict toolmark variance remains elusive. The marks used by toolmark examiners are random in nature, and thus establishing a probability model requires an empirical statistical approach. This is a stark contrast to DNA that uses a generative model (the Hardy-Weinberg equation). Despite these difficulties, scientists continue to research the concepts of frequency, probability, likelihood ratios and automated comparisons in field of toolmark identification (see Question 2 References, #'s 12-28).

NIST in collaboration with the FBI and crime labs across the U.S. is currently compiling a database of known test fired bullets and cartridge cases, and will be the curator of this set of reference samples. The purpose of the database, as outlined by NIST at http://www.nist.gov/forensics/ballisticsdb/, is to foster the development and validation of measurement methods, algorithms, metrics, and quantitative confidence limits for objective firearm identification. Furthermore, the database is intended to improve the scientific knowledge base on the similarity of marks from different firearms and the variability of marks from the same firearm, and ease the transition to the application of three-dimensional surface topography data in firearms identification. This database will serve as a useful set upon which different search and analysis software can be compared.

Additionally, the lack of frequency data or the ability to express an opinion as a likelihood ratio does not automatically lessen a scientific conclusion. Many of humankind's greatest scientific discoveries did not enjoy the benefit of a probability distribution but rather utilized detailed observations from clearly reasoned experimental design. It has historically been, and remains, a primary goal of the firearm and toolmark profession to support practitioners' conclusions with objective or statistical criteria. However, the fact that work remains does not make the current state of toolmark comparison bad science.

Question 3: How is performance testing (testing designed to determine the frequency with which individual examiners obtain correct answers) currently used in forensic laboratories? Are performance tests conducted in a blind manner? How could well-designed performance testing be used more systematically for the above pattern-based techniques to establish baseline error rates for individual examiners? What are the opportunities and challenges for developing and employing blind performance testing? What studies have been published in this area?

In firearms and toolmark identification, performance testing (as defined above) is determined by a series of different tests and experiments. First, the overall reliability of a trained examiner to correctly differentiate and associate items based on the comparison of microscopic toolmarks has been demonstrated through nearly a century of empirical research, validation tests, and proficiency test data. Furthermore, over the past decade, research using 3D topographical data and comparison algorithms provides strong, statistical support for the firearm and toolmark examiners experiential knowledge.

Within the laboratory, firearm and toolmark examiner training is often the most rigorous and time-intensive of all the forensic disciplines. A typical trainee will train for at least two years prior to performing any casework. Once the trainee has completed their training, they will be presented a series of competency tests. Following successful completion of these tests, they will advance onto performing monitored/supervised casework, after which they advance to journeyman level status and are qualified to perform full casework. Typically, post training, examiners are required to complete (at least) one proficiency test a year in each discipline they are qualified. Data has been collected from published results from commercial proficiency tests providers. This data has been used to evaluate potential error rates within the field. However, this data must be used with caution as the commercial providers do not control for the level of training or prior competency before issuing a test and recording the results. The evaluation of an individual examiner's performance on proficiency tests is often monitored by a laboratory quality assurance manager (Question #3 References, [1]).

The proficiency test is generally not blind; however, the correct answer is not known by the examiner. In order to combat some of the challenges in providing a truly blind test, some laboratory systems do periodically test examiners blindly through a re-examination process or a blind verification process. However, these practices anticipate a consensus opinion, and the answer is not one grounded in truth like the current proficiency test method. It would be extremely difficult to produce a truly blind test in a forensic laboratory. These considerations and complications of implementing blind forensic proficiency tests are well outlined in the articles by Peterson, et al (Question #3 References, [2,3]). To highlight some of the difficulties: The test provider(s) would have to produce fake reports, evidence, packaging, and all other documentation in order to make the evidence appear "real". Additionally, with many laboratory systems carrying case work backlogs, in order to not bias the examiner and treat the test blindly, it would have to be subject to the same timeliness criteria as other cases. This task alone is herculean given the patchwork nature of United States Forensic Laboratories. Furthermore, law enforcement investigators would have to submit requests to examine this evidence, and then the laboratory would have to ensure each examiner is provided a test, but do so in a "blind" manner. It is our opinion that this is not a practical use of laboratory resources (both cost and manpower). We are only aware of the studies referenced above (Peterson et al).

Question 4: What are the most promising new scientific techniques that are currently under development or could be developed in the next decade that would be most useful for forensic applications? Examples could include hair analysis by mass spectrometry, advances in digital forensics, and phenotypic DNA profiling.

The Firearms/Toolmarks subcommittee of the Organization of Scientific Area Committees (OSAC) has established a Task Group to study and evaluate the research and development of instruments and software that can accurately measure and compare microscopic toolmarks and provide statistical weight to the comparison. This technology has the potential to provide greater objectivity and statistically-supported conclusions to the science of firearms and toolmark comparison.

Question 5: What standards of validity and reliability should new forensic methods be required to meet before they are introduced in court?

In anticipation of the role that technology will play in the near future for Firearm and Toolmark Examination, the Firearms/Toolmarks subcommittee of the Organization of Scientific Area Committees (OSAC) is in the process of writing and publishing validation standards for the implementation of new technology in the firearms and toolmark laboratory.

Question 6: Are there scientific and technology disciplines other than the traditional forensic science disciplines that could usefully contribute to and/or enhance the scientific, technical and/or societal aspects of forensic science? What mechanisms could be employed to encourage further collaboration between these disciplines and the forensic science community?

The Organization of Scientific Area Committees, established by the National Institute of Standards and Technology (NIST) has as a primary goal to answer this very question. The majority of forensic science disciplines have now been brought together within one entity with a purpose of establishing scientifically sound standards of practice within each discipline. The ability to share knowledge and research and to collaborate between like disciplines is now a greater possibility which will only serve to enhance the technical and societal impacts of forensic science.

Specifically within the discipline of firearms and toolmarks comparison, our profession has begun collaboration with computer scientists utilizing machine learning algorithms. Machine learning is a subdiscipline of computer science that utilizes probability and statistics to develop algorithms for pattern recognition. Since the comparison of toolmarks is the comparison of patterns, the collaboration between firearms and toolmark examiners and computer scientists is a collaboration that has started to produce interesting research papers (examples cited in Question #6 References [1-10]).

Metrology is a second discipline that has enhanced the science of firearm and toolmark identification. Metrology is the science of measurement. In order to use computer pattern recognition algorithms to compare toolmarks, the toolmarks must be accurately measured. This is where the metrology scientists have (and will) help the forensic community evaluate and implement the best technology for the task at hand (examples cited in Question #6 References [11-18]).

We believe the firearms and toolmark examiner community, in collaboration with the disciplines above, has a good understanding of the problems and potential solutions facing our profession. The problem is finding time and funding to conduct the necessary research. The vast majority of the research published in forensic science journals is based on volunteered time and conducted by a few dedicated individuals. This country would be wise to implement a broader source of forensic science research funding (e.g. NSF and NIH). One way to accomplish this task would be to increase the research funding already provided by the NIJ. If the goal is to have forensic science research move forward faster, forensic science research needs to be a viable full time career option.

Question #2 References:

[1] Collins, E., et. al. “How Unique Are Impressed Toolmarks? An Empirical Study of 20 Worn Hammer Faces”; AFTE Journal, 2005, Vol 37(4), pp.252-295.

[2] Stone, R. “How Unique Are Impressed Toolmarks?” AFTE journal, 2003, Vol 35(4), pp.376-383.

[3] Neel, M., et. al. “A Comprehensive Statistical Analysis of Striated Tool Mark Examinations Part 1: Comparing Known Matches and Known Non-Matches”; AFTE Journal, 2007, Vol 39(3), pp.176-198.
[4] Wevers G., et al. “A Comprehensive Statistical Analysis of Striated Tool Mark Examinations; Part 2: Comparing Known Matches and Known Non-Matches using Likelihood Ratios”. AFTE Journal, 2011, Vol 43(2), pp.137-145.
[5] Uchiyama, T. “The Probability of Corresponding Striae in Toolmarks”;AFTE Journal, Vol 24(3), pp.273-290.
[6] Howitt, D. “A Calculation of the Theoretical Significance of Matched Bullets”; Journal of Forensic Sciences, 2008, Vol 53(4), pp.868-875.
[7] Biasotti, A. A. “A Statistical Study of the Individual Characteristics of Fired Bullets”; Journal of Forensic Sciences, 1959, Vol 4(1), pp.34-50.
[8] Deinet, W., "Studies of Models of Striated Marks Generated by Random Processes", Journal of Forensic Sciences, 1981, vol. 26(1), pp.35-50.
[9] Brackett, J. W. "A Study of Idealized Striated Marks and their Comparisons using Models", Journal of the Forensic Science Society, vol. 10 (1), January, 1970, pp. 27-56.
[10] Hatcher, J.S., et al., "Firearm Investigation Identification and Evidence", The Stackpole Company, 1957 P. 389 P.380.
[11] Heard, B. J., "Handbook of Firearms and Ballistics", Wiley & Sons, 1997, pp. 136-141
[12] Bunch, S., et al. “Application of likelihood ratios for firearm and toolmark analysis”; Sci Justice, 2013, 53(2) pp.223-9.
[13] Riva, F., et al. “Automatic comparison and evaluation of impressions left by a firearm on fired cartridge cases” J Forensic Sci, 59(3)637-47.
[14] Weller, T., et al. “Introduction and Initial Evaluation of a Novel Three-Dimensional Imaging and Analysis System for Firearm Forensics” AFTE Journal, 2015, 47(4) 198-208.
[15] Chu W., et al. "Validation Tests for the Congruent Matching Cells (CMC) Method Using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides", AFTE Journal, 2013, 45(4), 361-366.
[16] Petraco, D. K., et al., "Addressing the National Academy of Sciences Challenge: A Method for Statistical Pattern Comparison of Striated Tool Marks", J. Forensic Sci, 2012, 57(4), 900-911.
[17] Petraco D. K., et al., "Application of Machine Learning to Toolmarks: Statistically Based Methods for Impression Pattern Comparisons", NIJ/NCJRS Document #239048, Award #2009-DN-BX-K041, July 2012.
[18] Bachrach, B. “A Statistical Validation of the Individuality and Repeatability of Striated Tool Marks: Screwdrivers and Tongue and Groove Pliers” J. Forensic Sci 2010 55(2) pp.348-357.
[19] Bachrach, B. "Development of a 3D-Based Automated Firearms Evidence Comparison System", Journal of Forensic Sciences, Vol. 47(6), November 2002, pp. 1253-1264.

[20] Chu, W., et al., "Automatic Identification of Bullet Signatures Based on Consecutive Matching Striae (CMS) Criteria", Forensic Science International, 231, 2013, Pp. 137-141
[21] Banno, A., et al. “Three Dimensional Visualization and Comparison of Impressions on Fired Bullets,” Forensic Science International, Vol.140, 2004, pp. 233–240.
[22] Bolton-King, R., et al., “What are the Prospects of 3D Profiling Systems Applied to Firearms and Toolmark Identification,” AFTE Journal, Vol. 42, No. 1, 2010, pp. 23–33
[23] Gambino, C., et al., “Forensic Surface Metrology: Tool Mark Evidence,” Scanning, Vol. 33, 2011, pp. 272–278.
[24] Petraco, N., et al. “Estimates of Striation Pattern Identification Error Rates by Algorithmic Methods,” AFTE Journal, Vol. 45, No. 3, 2013, pp. 235–244.
[25] Yammen, S., and Muneesawang, P., “Cartridge Case Image Matching Using Effective Correlation Area Based Method,” Forensic Science International, Vol. 229, 2013, pp. 27–42.
[26] Zheng, A., Soons, J., Thompson, R., Villanova, J., and Kakal, T., “2D and 3D Topography Comparisons of Toolmarks Produced from Consecutively Manufactured Chisels and Punches,” AFTE Journal, Vol. 46, No 2, 2014, pp.143–147.
[27] Spotts R., et al. “Angular Determination of Toolmarks Using a Computer-Generated Virtual Tool” J. Forensic Sci 2015 60(4) pp. 878-884.
[28] Hamby, J., et al. “Evaluation of GLOCK 9 mm Firing Pin Aperture Shear Mark Individuality Based On 1,632 Different Pistols by Traditional Pattern Matching and IBIS Pattern Recognition” J. Forensic Sci, doi:10.1111/1556-4029.12940.

Question #3 References

[1] Murphy, D., “CTS Error Rates, 1992-2005 Firearms/Toolmarks”, Presented at the 41st Association of Firearm and Tool Mark Examiners (AFTE) Training Seminar, Henderson, NV, May 5, 2010.
[2] Petersen, J.L., et al. “The feasibility of external blind DNA proficiency testing. I. Background and findings” J. Forensic Sci, 2003, 48(1) pp. 21-31.
[3] Petersen, J.L., et al. “The feasibility of external blind DNA proficiency testing. II. Experience with actual blind tests.” J. Forensic Sci, 2003, 48(1) pp. 32-40.

Question #6 References

[1] Grieve, T. “Objective Comparisorements of NIST SRM 2460 standard bullets by four techniques.” Meas Sci Technol 2006;17: pp. 500–3.
[17] Ma, L., et al, “NIST Bullet Signature Measurement System for RM (Reference Material) 8240 Standard Bullets” J. Forensic Sci 2014 49(4): pp. 649-59 .
[18] Song, J., et al. “Three Steps towards Metrological Traceability for Ballistics Signature Measurements” Meas. Sci. Review 2009 10(1) pp. 19-21.n of Toolmarks from the Cutting Surfaces of Slip-Joint Pliers” AFTE Journal 2014 46(2) pp. 176-185.

[2] Riva, F., et al. “Automatic comparison and evaluation of impressions left by a firearm on fired cartridge cases” J Forensic Sci, 59(3) pp.637-47.
[3] Roth, J., et al. “Learning-based Ballistic Breech Face Impression Image Matching” Conference: the IEEE Seventh International Conference on Biometrics: Theory, Applications and Systems (BTAS 2015), At Arlington, Virginia
[4] Weller, T., et al. “Introduction and Initial Evaluation of a Novel Three-Dimensional Imaging and Analysis System for Firearm Forensics” AFTE Journal, 2015, 47(4) pp. 198-208.
[5] Petraco, D. K., et al., "Addressing the National Academy of Sciences Challenge: A Method for Statistical Pattern Comparison of Striated Tool Marks", J. Forensic Sci, 2012, 57(4), pp. 900-911.
[6] Petraco, N., et al. “Estimates of Striation Pattern Identification Error Rates by Algorithmic Methods,” AFTE Journal, Vol. 45, No. 3, 2013, pp. 235–244.
[7] Chu, W., et al., "Automatic Identification of Bullet Signatures Based on Consecutive Matching Striae (CMS) Criteria", Forensic Science International, 231, 2013, Pp. 137-141
[8] Song, J. “Proposed "NIST Ballistics Identification System (NBIS)" Based on 3D Topography Measurements on Correlation Cells” AFTE Journal 2013 45(2) pp. 184-194
[9] Chu, W., et al. "Validation Tests for the Congruent Matching Cells (CMC) Method Using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides", AFTE Journal, 2013, 45(4), pp. 361-366.
[10] Spotts, R., et al. “Angular Determination of Toolmarks Using a Computer-Generated Virtual Tool” J. Forensic Sci 2015 60(4) pp.878-884.
[11] Zheng, X., et al. “Applications of surface metrology in firearm identification” Surf. Topogr.: Metrol. Prop. 2014(2) 10pp.
[12] Weller, T., et al. “Confocal Microscopy Analysis of Breech Face Marks on Fired Cartridge Cases from 10 Consecutively Manufactured Pistol Slides” J. Forensic Sci 2012 57(4)pp. 912-917.
[13] Gambino, C., et al., “Forensic Surface Metrology: Tool Mark Evidence,” Scanning, Vol. 33, 2011, pp. 272–278.
[14] Song, J., et al. “Topography Measurements and Performance Comparisons between NIST SRM 2460 Standard Bullet Masters and BKA Bullet Replicas” AFTE Journal 2012 44(3) pp. 208-217.
[15] Vorburger, T.V.,et al. “Surface topography analysis for a feasibility assessment of a national ballistics imaging database. A report prepared for the National Academies Committee to assess the feasibility, accuracy, and technical capability of a National Ballistics Database.” NISTIR 7362 2007; pp. 1–171.
[16] Song, J., et al. “Correlation of topography measurements of NIST SRM 2460 standard bullets by four techniques.” Meas Sci Technol 2006;17:500–3.
[17] Ma, L., et al. “NIST Bullet Signature Measurement System for RM (Reference Material) 8240 Standard Bullets” J. Forensic Sci 2014 49(4):649-59 .

[18] Song, J., et al. “Three Steps towards Metrological Traceability for Ballistics Signature Measurements” Meas. Sci. Review 2009 10(1)19-21.

Sincerely,

[redacted] (b)(6) per EOUSA

Andy Smith
Chair
OSAC Firearm/Toolmark Subcommittee

The Association of Firearm and Tool Mark Examiners (AFTE) December 23, 2015 response to seven questions related to forensic science posed on November 30, 2015 by The President's Council of Advisors on Science and Technology (PCAST):

Q1 Part 1: *What studies have been published in the past 5 years that support the foundational aspects of each of the pattern-based forensic science methods, including (but not limited to) latent print analysis; firearms/toolmarks; shoe/tire prints; bitemark analysis; questioned documents*?

The Scientific Working Group for Firearm and Toolmarks (SWGGUN) developed the Admissibility Resource Kit (ARK) in 2005 to assist forensic firearm and tool mark examiners in the preparation for evidence admissibility hearings. When the SWGGUN was defunded in 2013, the AFTE Board of Directors and the past SWGGUN members decided to republish and maintain the ARK on the AFTE website. The ARK contains a collection of resources that represents significant research, legal opinions, challenges, rulings and other issues related to the discipline. The foundational research included on the ARK extends well beyond the past 5 years.

https://afte.org/resources/swggun-ark

The following are literature citations, all published within the last five years, for the more important studies that qualify as material principally concerned with the validity of firearm and toolmark identification. A short summary follows each citation.

Scientific practice demands that possible exceptions be researched and published (efforts to test or falsify), and that a large body of confirmatory evidence from training programs, experimentation, etc., will forever remain unpublished.

<u>Testability of the Scientific Principle</u>

Firearms Identification, Bullets

Hamby, J, et al, "The Identification of Bullets Fired From 10 Consecutively Rifled 9MM RUGER Pistol Barrels – A Research Project Involving 619 Participants from 23 Countries Using Optical Comparison Microscopy and 'Ballistics' Imaging Instrumentation with an Analysis of Possible Error Rate Using Bayesian Statistics", Journal of Forensic Sciences (In Press) 2015

Ten consecutively rifled RUGER P-85 pistol barrels were obtained from the manufacturer and then test fired to produce known test bullets and 'unknown' bullets for comparison by firearms examiners from around the world. This study is a continuation of one originally designed and reported on by David Brundage. The original study was primarily limited to examiners from nationally accredited laboratories in the United States and we wanted to expand the study to provide test sets for firearms examiners around the world. The RUGER P-85 pistol and the 10 consecutively rifled barrels were borrowed from the Illinois State Police. Ammunition was obtained from the Winchester Ammunition Company (A Division of Olin), and 240 tests sets produced and distributed to forensic scientists and researchers around the world. A thesis, which involved a total of 201 participants – including the original 67 reported on by Brundage - was published by Hamby in 2001. This paper reports on the final conclusions of the research conducted by Brundage, Hamby and Thorpe over a 15-year period. Recently, 20 additional test sets were manufactured using a 4^{th} type of 9mm Luger ammunition and polymer 'clone' sets made as well. These sets – both actual bullets and clone sets – have been distributed for use in forensic laboratories worldwide. (Note- Currently this research project has a total of 653 participants from 31 countries)

Chu, et al., "Automatic Identification of Bullet Signatures Based on Consecutive Matching Striae (CMS) Criteria", Forensic Science International, Volume 231, 2013, pp. 137-141.

This paper described a study of fired bullet markings from ten consecutively manufactured firearm barrels by an automated 3D signature analytic method. This study used 3D topography image capture technology with acquisitions that were cross-correlated to existing firearm Consecutive Matching Striae (CMS) identification criteria. Results provided a fairly objective test that demonstrated support for these firearm CMS criteria.

Wong, C., "The Inter-Comparison of 1,000 Consecutively-Fired 9mm Luger Bullets and Cartridge Cases from a Ruger P89 Pistol Utilizing both Pattern Matching and Quantitative Consecutive Matching Striae as Criteria for Identification", AFTE Journal, Volume 45(3), Summer 2013, pp. 267-272.

Previous studies have investigated the effect of consecutive firing of firearms to determine how the wear on barrels and breechfaces would affect the identification of fired bullets and cartridge cases. This study was conducted to determine if the toolmarks on fired bullets and cartridge cases would change significantly after firing 1,000 cartridges through a Ruger P89 9mm Luger semiautomatic pistol, while using both pattern matching and quantitative consecutively matching striae (QCMS) as identification criteria during the comparison process. While there were some differences between the toolmarks on the bullets and cartridge cases throughout the firing sequence, each bullet and cartridge case was successfully identified to the first bullet or cartridge case.

Mikko, D., et al., "Reproducibility of Toolmarks on 20,000 Bullets fired through an M240 Machine Gun Barrel", AFTE Journal, Volume 44, Number 3, Summer 2012, pp. 248-253.

This article discusses the reproducibility of toolmarks on 7.62mm high velocity bullets fired through a single M240 machine gun barrel. Over the years, there have been several research studies and published articles pertaining to consecutively manufactured rifled barrels and the ability to microscopically identify bullets as having been fired through the same barrel of a firearm; however, to the knowledge of the authors, there has not been any in-depth microscopic study pertaining to 20,000 bullets being fired through a single rifled barrel and subsequently identified to that particular barrel. This study was designed to provide credible evidence in regards to the reproducibility and uniqueness of striations on the bearing surfaces of fired bullets. Despite changes to the reproducibility of some of the individual markings over the course of the study, the authors were able to correctly identify the barrel of origin for each of the collected fired bullets. See subsequent related article: Mikko, D. and Miller, J., "An Empirical Study/Validation Test Pertaining to the Reproducibility of Toolmarks on 20,000 Bullets Fired

Through M240 Machine Gun Barrels", AFTE Journal, Volume 45, Number 3, Summer 2013, pp. 290-291.

Mikko, D. and Miller, J., "An Empirical Study/Validation Test Pertaining to the Reproducibility of Toolmarks on 20,000 Bullets Fired Through M240 Machine Gun Barrels", AFTE Journal, Volume 45, Number 3, Summer 2013, pp. 290-291.

This article is a follow-up to an article that was published in the AFTE Journal-Volume 44, Number 3-Summer 2012, titled "Reproducibility of Toolmarks on 20,000 Bullets fired through an M240 Machine Gun Barrel". Using a second M240 Machine gun with its original barrel, along with a new spare barrel assembly, thirty (30) additional bullets were test fired through both barrels and subsequently inter-compared blindly by four firearm and toolmark examiners, one of which had just completed his formal two-year training period. Additionally, the recovered (60) test fired bullets from both barrels were also mixed with the 127 bullets recovered during the test firing of 20,000 bullets in the reproducibility study and examined by the four firearm and toolmark examiners in a blind test study, in order to determine whether or not the examiners could correctly identify or eliminate the bullets as being fired through the correct barrel. A total of 164 questioned fired bullets were examined, which resulted in 164 correct answers from the participants in the study (zero percent error rate).

Fadul, T. G., "An Empirical Study to Evaluate the Repeatability and Uniqueness of Striations/Impressions Imparted on Consecutively Manufactured Glock EBIS Gun Barrels", AFTE Journal, Volume 43, Number 1, Winter 2011, pp. 37-44.

This paper describes an empirical study of ten consecutively manufactured Glock barrels containing the Enhanced Bullet Identification System (EBIS). Study consisted of test sets sent to 238 examiners from 150 laboratories in 44 states and 9 countries that were designed to test the examiner's ability to correctly identify fired bullets to the barrel that fired them. The results from 183 of these examiners produced an error rate of 0.4%. This study validated the repeatability and uniqueness of striated markings in gun barrels, as well as the ability of a competent examiner to reliably identify fired bullets to the barrels that marked them.

Intelligent Automation, Incorporated, "A Statistical Validation of the Individuality of Guns Using High Resolution Topographical Images of Bullets", National Institute of Justice Grant #2006-DN-BX-K030, October, 2010

This was a study of marks on fired bullets by a topography based (3D) automated system. This study continued the analysis of a previous 2005 NIJ bullet study and validated the original premise of Firearm/Toolmark ID. This study also concluded that 1) the ability to determine that a given bullet was fired from a specific barrel depends on the individual barrel itself and not only on the brand of its manufacture, and 2) the performance of the automated analysis system used in this study is not representative of that of a trained firearms examiner as humans have a remarkable ability to perform pattern matching that is difficult to be replicated in any automated system.

Firearms Identification, Cartridge Cases

Hamby, J., et al, "Evaluation of GLOCK 9mm Firing Pin Aperture Shear Mark Individuality Based On 1,632 Different Pistols by Traditional Pattern Matching and IBIS Pattern Recognition", Journal of Forensic Sciences (In Press) 2015.

Over a period of 21 years, a number of fired GLOCK cartridge cases have been evaluated. A total of 1,632 GLOCK firearms were used to generate a sample of the same size. Our research hypothesis was that no cartridge cases fired from different 9-mm semi-automatic GLOCK pistols would be mistaken as coming from the same gun. Using optical comparison microscopy, two separate experiments were carried out to test this hypothesis. A sub-sample of 617 test fired cases were subjected to algorithmic comparison by the Integrated Ballistics Identification System (IBIS). The second experiment subjected the full set of 1,632 cases to manual comparisons using traditional pattern matching. None of the cartridge cases were "matched" by either of these two experiments. Using these empirical findings, an established Bayesian probability model was used to estimate the chance that a 9-mm cartridge case could be mistaken as coming from the same firearm when in fact it did not (i.e. the random match probability).

Baldwin, D.P., et al., "A Study of False-Positive and False-Negative Error Rates in Cartridge Case Comparisons", USDOE Technical Report # IS-5207 (April 7, 2014)

This report provides the details for a study designed to measure examiner (not laboratory) error rates for false identifications and false eliminations when comparing an unknown to a collection of three known cartridge cases. Volunteer active examiners with Association of Firearm and Toolmark Examiners (AFTE) membership or working in laboratories that participate in ASCLD were provided with 15 sets of 3 known + 1 unknown cartridge cases fired from a collection of 25 new Ruger SR9 handguns. The ammunition was all Remington 9-mm Luger (manufacturer designation L9MM3) and sets were made up of cartridge cases fired within 100 cartridges of each other for each gun. During the design phase of the experiment, examiners had expressed a concern that known samples should not be separated by a large number of fired cartridges. However, studies published on this effect indicate that several thousands of cartridges could be fired by the same firearm without making the identifying characteristics change enough to prevent identification. [1] Examiners were provided with a background survey, an answer sheet allowing for the AFTE range of conclusions, and return shipping materials. They were also asked to assess how many of the 3 knowns were suitable for comparison, providing a measured rate of how often each firearm used in the study produces useable, quality marks. The participating examiners were provided with known positives and known negatives from independent groups of samples, providing independent measurements of a false-positive rate and independent measurements of a false-negative rate, allowing the study to measure both rates and uncertainties in those rates.

Responses were received from 218 participating examiners. The rate of false negatives (estimated as 0.367% from comparisons known to be from the same firearm but reported as eliminations) was quite low with the error distributed across examiners of various backgrounds (state, federal, local, private, etc. as determined from self-reported survey information). The overall rate of false positives (estimated as 1.01% from comparisons known to be from different firearms but reported as identifications) was significantly higher. However, most of the errors were reported by a small number of examiners; that is, individual examiners have varying error rates. For most examiners this is quite low while for some it is relatively high. Hence the overall rate is best interpreted as an average of widely varying individual rates. Inconclusive results were not recorded as errors. Rates of poor quality mark production for these handguns varied across the 25 sample handguns. Those rates were 2.3 (±1.4) %.

False-positive and false-negative error rates for individual examiner performance on comparisons were measured. The rates are not uniform across the sample population with a few examiners providing most of the false-positive responses. False-negative rates are low and comparable to or lower than the rate of production of poor quality marks by the firearms used in this study. Laboratory error rates may be significantly lower than these individual rates if quality assurance procedures are applied that can effectively manage to reduce or eliminate the propagation of false positives reported by individuals.

Stroman, A., “Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double-Blind Format”, AFTE Journal, Vol. 46(2), Spring 2014, pp. 157-175.

This paper describes a no-gun empirical study of fired cartridge cases to determine the frequency of error in firearms identification using a declared double-blind testing format; i.e., a declared test containing blind elements. Seventy-four of seventy-five examiners accurately identified the questioned fired cartridge cases to the respective known specimens with no false positives. This study also demonstrated that examiners were able to accurately evaluate breechface markings avoiding mis-identifications from substantial subclass marks borne by the cartridge cases.

Chu, Tong and Song, “Validation Tests for the Congruent Matching Cells (CMC) Method Using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides”, AFTE Journal, Volume 45(4), Fall 2013, pp. 361-366.

This was a study of ten (10) consecutively manufactured slides using 3D topography technology with correlations of paired breech marking correlation cells to establish firearm identifications. Test results showed significant separation between KM and KNM distributions without any false positive or false negative identification.

Fadul, et al, “An Empirical Study to Improve the Scientific Foundation of Forensic Firearm and Tool Mark Identification Utilizing Ten (10) Consecutively Manufactured Slides”, AFTE Journal, Volume 45(4), Fall 2013, pp. 376-389.

Empirical study of marks produced from 10 consecutively Ruger brand manufactured pistol slides by 217 firearm examiners from 46 states and the District of Columbia. Results of this study established an error rate of less than 0.1%, and validated toolmark durability as these slides maintained their individual signature after multiple firings.

Stowe**,** A., “The Persistence of Chamber Marks From Two Semiautomatic Pistols on Over 1,440 Sequentially-Fired Cartridge Cases”, AFTE Journal, Vol. 44(4), Fall 2012, pp. 293–308.

A Browning Hi-Power semiautomatic pistol and a Hi-Point Model C semiautomatic pistol were test fired a total of 1,440 times each, and their chamber marks were examined. Ammunition used included cartridges with cases made of aluminum, brass and nickel-plated brass. Microscopic examination of the chamber marks revealed that they were reproducible and identifiable up to 960 firings and that the metallic composition of the cartridge case does not affect the reproducibility of the chamber marks.

Petraco D. K., et al, "Application of Machine Learning to Toolmarks: Statistically Based Methods for Impression Pattern Comparisons", NIJ/NCJRS Document #239048, Award #2009-DN-BX-K041, July 2012

This was a statistical study that evaluated 3D quantitative surface topographies of toolmarks, consisting of fired cartridge cases, screwdriver and chisel striations, generated using confocal microscopy. Principal component and canonical variate analysis, as well as support vector machine methodology, was used to objectively associate these toolmarks with the tools that produced them. Estimated toolmark identification error rates were approximately 1% using these algorithmic methods. The findings of this objective and quantitative scientific research support the general conclusions codified in the AFTE Theory of Identification.

Weller, T. J., et al, "Confocal Microscopy Analysis of Breech Face Marks on Fired Cartridge Cases from 10 Consecutively Manufactured Pistol Slides", Journal of Forensic Sciences, Volume 57(4), July 2012, pp. 912-917.

This was a study of 90 test fired cartridge case specimens from ten consecutively manufactured pistol slides. A total of 8010 comparisons were conducted by using confocal microscopy with a 3D cross-correlation analysis logarithm. The average match scores were 0.82 with the average non-match scores 0.20. There was no overlap of scores between matching and non-matching test scores. This study provided objective data that supports the AFTE Theory of Identification.

Valle, F., et al, "Nanotechnology for Forensic Sciences: Analysis of PDMS Replica of the Head of Spent Cartridge Cases by Optical Microscopy, SEM and AFM for the Ballistic Identification of Individual Characteristics Features of Firearms", Forensic Science International, Issue 222, 2012, pp. 288-297.

A novel application of replica molding to a forensic problem, viz. the accurate reproduction of the case head of gun and rifle cartridges, prior and after being shot, is presented. The fabrication of an arbitrary number of identical copies of the region hit by the firing pin and the breech face is described. The replicas can be (i) handled without damaging the original evidence, and (ii) distributed to different law enforcement agencies for comparison against other evidence found on crime scenes or ballistics tests of seized firearms, (iii) maintained on a file in the laboratory. A detailed analysis of the morphological features was carried out using a variety of instrumentation.

Mayland, B. and Tucker, C., "Validation of Obturation Marks in Consecutively Reamed Chambers", AFTE Journal, Volume 44(2), Spring, 2012, pp. 167-169.

This study of fired cartridge cases from ten consecutively manufactured firearms was conducted to determine the reproducibility and reliability of obturation marks from reamed chambers for identification purposes. Results of this empirical study, which consisted of sixty-four (64) participants from nineteen (19) national laboratory systems, effected a sensitivity rating of 0.927. These results demonstrate that obturation markings imparted on fired cartridge cases can be used as a reliable means of identification to the firearm that marked them.

Saribey, A, and Hannam, A., "Comparison of the Class and Individual Characteristics of Turkish 7.65mm Browning / .32 Automatic Caliber Self-Loading Pistols with Consecutive Serial Numbers", Journal of Forensic Sciences, Volume 58(1), January 2012, pp. 146-150.

Firearms identification is based on the fundamental principle that it is impossible to manufacture two identical items at the microscopic level. As firearms manufacturing technologies and quality assurance are improving, it is necessary to continually challenge this principle. In this study, two different makes of 7.65mm Browning / .32 caliber self-loading pistols of Turkish manufacture were selected and examined. Ten pistols with consecutive serial numbers were examined and test fired 10 times. The fired cartridge cases were recovered for comparison purposes. It was found that for each make of pistol, the individual characteristics within the firing pin impression, ejector and breech face marks of all 10 pistols were found to be significantly different.

La Porte, D., "An Empirical Validation Study of Breechface Marks on .380 ACP Caliber Cartridge Cases Fired from Ten Consecutively Finished Hi-Point Model C9 Pistols", AFTE Journal, Volume 43, Number 4, Fall 2011.

An empirical study was conducted using ten (10) consecutively finished Hi-Point model C9 slides and one frame acquired from the Hi-Point Manufacturing Company in Mansfield, Ohio. The ten (10) slides were mounted on the frame and test fired to obtain cartridge cases for comparison. The test fired cartridge cases were microscopically examined, evaluated and compared for class and individual characteristics that resulted from the manufacturing process. Prominent striations were evident on each test-fired cartridge case. These resulted from sanding of the breech face. The variations that occur during the manufacturing process of sanding result in unique, identifiable, individual breech face marks devoid of subclass influence. A limited validation study was conducted after the empirical study. Correct associations were made during this limited study.

Thompson, R., Song, J., Zheng, A., and Yen, J., "Cartridge Case Signature Identification Using Topography Measurements and Correlations: Unification of Microscopy and Objective Statistical Methods", National Institute of Standards and Technology, Presented at the 18th European Network of Forensic Science Institutes (ENFSI) Conference, Lisbon, Portugal, October, 2011

A comparison microscope employing the standard optical comparison method and confocal microscopy, with subsequent cross-correlation topography analysis, were used to correctly identify cartridge cases fired from ten consecutively made pistol slides. Subsequent cross correlation function analysis and statistical analysis of match and non-match scores correctly identified the fired cartridge cases back to their respective known slide source in 19 of 20 occasions with one inconclusive result. Results of the mathematical determination of slide source were compared to the validated results from the microscopic comparisons.

Lightstone, L., "The Potential for and Persistence of Subclass Characteristics on the Breech Faces of SW40VE Smith & Wesson Sigma Pistols", AFTE Journal, Volume 42(4), Fall 2010, pp. 308-322.

An article published in the 2007 AFTE Journal Summer edition discusses a situation in which a high degree of subclass characteristics were found in two firearms during routine casework. Gene Rivera of the Charlotte-Mecklenburg Police Department Crime Laboratory describes how these two firearms came to be discovered through the use of NIBIN, and reemphasizes the importance of the firearms examiner's job to be able to recognize and distinguish subclass characteristics when present. It was this striking case that prompted further research into the propensity and persistence of subclass characteristics in the Sigma Series line, and the potential for individuality to be established on these firearms.

Toolmark Identification

King, E., "Validation Study of Computer Numerical Control (CNC) Consecutively Manufactured Screwdrivers", AFTE Journal, Volume 47(3), Summer 2015, pp. 171-176.

The purpose of this research was to perform a validation study to determine if screwdrivers that are consecutively manufactured using the computer numerical control (CNC) process can be identified by trained forensic examiners after having their class characteristics reproduced by striated toolmark samples. The results were based on participation from seven members of the Scientific Working Group for Firearms and Toolmarks (SWGGUN) and yielded an error rate of 0.00%. This result provides support of toolmark identification in the scientific community, thus complying with the Daubert standard. These results further demonstrate the CNC-consecutively manufacturing process did not eliminate the individual or class characteristics of the screwdrivers and does not interfere with the ability of examiners to correctly associate tools with the marks they leave on surfaces.

Ekstrand, et al, "Virtual Tool Mark Generation for Efficient Striation Analysis", Journal of Forensic Sciences, Volume 59(4), 2014, pp. 950-959.

This is a follow-up study on Zhang and Chumbley's research regarding the development of virtual toolmarks by a 3-D computer simulation that would allow for the development of highly predictable toolmark characterizations. Initial study involved the production of test toolmarks by six screwdriver tips that were then compared by a previously developed statistical algorithm. Preliminary experimental results indicate that the use of a manipulative, virtual tool could provide quantitative data for the characterization of tool marked surfaces that would improve the scientific basis of toolmark identification. These results support the present theory and conclusions held in Toolmark Identification.

Zheng, X.A., et al, “2D and 3D Topography Comparisons of Toolmarks Produced from Consecutively Manufactured Chisels and Punches”, AFTE Journal, Vol. 46(2), Spring 2014, pp. 143-147.

This paper described an automated blind study of toolmarks from consecutively made chisel and punches utilizing 2D and 3D topography analysis. These analytical comparative results were expressed as a maximum value of the normalized Cross Correlation Function (CCF). Based on the CCF metric, all of the toolmarks were correctly identified to the tool that produced them. This study provides additional objective scientific support for the validity of Toolmark Identification.

Chumbley, S. and Morris, M., “Significance of Association in Tool Mark Characteristics”, Department of Justice (DOJ) Grant 2009-DN-R-119, Document 243319, August 2013 (Ames Laboratory)

In a recent study of tool marks produced by sequentially made screwdriver tips, the authors developed a computer algorithm that would reliably separate matching tool marks from those that do not match using an analysis based on Mann-Whitney U-statistics applied to data files containing 2-dimensional information obtained using an optical profilometer. These successful results indicate that the significance of association can be accomplished by statistical evaluation of the data file. The work carried out in the present project (and discussed in the report) built upon this success by providing additional statistical information that will increase the relevance of the measurements obtained.

Grieve, T., “Objective Analysis of Toolmarks in Forensics”, Graduate Thesis and Dissertations, Paper 13014, 2013, Iowa State University

Since the 1993 court case of *Daubert v. Merrell Dow Pharmaceuticals, Inc.* the subjective nature of toolmark comparison has been questioned by attorneys and law enforcement agencies alike. This has led to an increased drive to establish objective techniques with known error rates, much like the DNA analysis is able to provide. This push has created research in which the 3-D surface profile of two different marks are characterized and the marks’ cross sections are run through a comparative statistical algorithm to acquire a value that is intended to indicate the likelihood of a match between the marks. The aforementioned algorithm has been developed and extensively tested through comparison of evenly striated marks made by screwdrivers. However, this algorithm has yet to be applied to quasi-striated marks such as those made by the shear edge of slip-joint pliers. The results of this algorithm’s application to the surface will be presented.

Objective mark comparison also extends to comparison of toolmarks made by firearms. In an effort to create objective comparisons, microstamping of firing pins and breech faces have been introduced. The process involves placing unique alphanumeric identifiers surrounded by a radial code on the surface of the firing pins, which transfer to the cartridge's primer upon firing. Three different guns equipped with micro stamped firing pins were used to fire 3000 cartridges. These cartridges are evaluated based on the clarity of their alphanumeric transfers and the clarity of the radial code surrounding the alphanumerics.

Petraco, N., et al, "Estimation of Striation Pattern Identification Error Rates by Algorithmic Methods", AFTE Journal, Volume 45(3), Summer 2013, pp. 235-244.

This was a computational study using algorithmic methods of toolmark striation patterns produced by screwdriver tips and firearm firing pin apertures in determining error rates. Multivariate analysis, as well as support vector machine methodology, was used to objectively associate these toolmarks with the tools that produced them. Estimated toolmark identification error rates were approximately 1% using these algorithmic methods. The findings of this objective and quantitative scientific research support the general conclusions codified in the AFTE Theory of Identification.

Petraco, N., et al, "Application of Machine Learning to Toolmarks: Statistically Based Methods for Impression Pattern Comparisons", NIJ/NCJRS Document #239048, Award #2009-DN-BX-K041, July 2012

This was a statistical study using 3D quantitative surface topographies of toolmarks, consisting of fired cartridge cases, screwdriver and chisel striations, by confocal microscopy. Principal component and canonical variate analysis, as well as support vector machine methodology, was used to objectively associate these toolmarks with the tools that produced them. Estimated toolmark identification error rates were approximately 1% using these algorithmic methods. The findings of this objective and quantitative scientific research support the general conclusions codified in the AFTE Theory of Identification.

Chumbley, L. S., et al, "Validation of Tool Mark Comparisons Obtained Using a Quantitative, Comparative, Statistical Algorithm", Journal of Forensic Sciences, Volume 55(4), 2010, pp. 953-961.

A statistical analysis and computational algorithm for comparing pairs of toolmarks by profilometry data was conducted. Toolmarks produced by 50 sequentially made screwdrivers, at selected fixed angles, were analyzed both empirically by practicing examiners and by the established computational algorithms. The results of these comparisons, as well as a subsequent blind study with the practicing examiners, showed scores of good agreement between the algorithm and human experts. It was also noted that in some of the examination phases, examiner performance was much better than the algorithm.

Bachrach B., Jain A., Jung S., Koons R.D., "A Statistical Validation of the Individuality and Repeatability of Striated Tool Marks: Screwdrivers and Tongue and Groove Pliers", Journal of Forensic Sciences, Volume 55(2), 2010, pp. 348-357.

This study statistically validated the original premise of individuality in Toolmark Identification by analyzing statistical distributions of similar values resulting from the comparison of Known Matches (KM) and Known Non-Matched (KNM) pairs of striated toolmarks. This quantifiable analysis of KM and KNM toolmark similarity distributions showed nearly error-free identifications.

Firearm and Toolmark Identification Theoretical

Kerkhoff, W., et al, "The Likelihood Ratio Approach in Cartridge Case and Bullet Identification", AFTE Journal, Volume 45(3), Summer 2013, pp. 284-289.

This article summarizes the different aspects of the discussion that led to the implementation of the likelihood ratio approach of firearms identification by the Firearms Section of the Netherlands Forensic Institute (NFI). The authors' (three firearms examiners and a statistician) perspectives on the use of this approach in cartridge case and bullet comparison are shared.

Heikkinen, V., et al, "Quantitative High-Resolution 3D Microscopy Improves Confidence When Determining the Order of Creation of Toolmarks", AFTE Journal, Volume 45(2), Spring 2013, pp. 150-159.

The authors of this paper address the problem of determining the order of creation of engravures (toolmarks) on spent cartridges and fired bullets. We employ quantitative high resolution large area 3D optical imaging for traceable comparison. This solution is novel in the sense that so far only qualitative 2D imaging has been used to address this issue. Our main result is that we can now determine the order of creation of two different kinds of toolmarks on spent cartridges. The main impact of the result is that this technique improves the investigator's confidence when determining the order of creation of the marks as well as the direction of the engravure. Our work advances the state of the art in the field of forensic toolmark inspection by enabling a new quantitatively measured dimension (2D->3D) to improve the objectivity of the forensic analysis. Our work was carried out on copper that was scratched with a steel stylus in a controlled manner. The method was validated using spent cartridges. In practice this effort could aid inspection work aiming at telling apart marks created by the cartridge manufacturer from those made by the gun that fired the cartridge.

Bolton-King, R., et al., "Numerical Classification of Curvilinear Structures for the Identification of Pistol Barrels", Forensic Science International, Issue 220, 2012, pp. 197-209.

This paper demonstrates a numerical pattern recognition method applied to curvilinear image structures. These structures are extracted from physical cross-sections of cast internal pistol barrel surfaces. Variations in structure arise from gun design and manufacturing methods providing a basis for discriminations and identification. Binarised curvilinear land transition images are processed with fast Fourier transform on which principal component analysis is performed. The proposed methodology is therefore a promising novel approach for the classification and identification of firearms.

Petraco, D. K., et al, “Addressing the National Academy of Sciences’ Challenge: A Method for Statistical Pattern Comparison of Striated Tool Marks”, Journal of Forensic Sciences, Volume 57(4), 2012, pp. 900-911.

Toolmark test specimens from nine slotted screwdrivers were encoded into high-dimensional feature vectors and analyzed by multiple statistical pattern recognition methods. The statistical methods used which are widely known and accepted in academic applications, rely on few assumptions of the data’s underlying distribution, can be accompanied by standard confidence levels and are falsifiable. Correct classification rates of at least 97% were achieved.

Fracture Matching

Claytor, D., “Validation of Fracture Matching Through the Microscopic Examination of the Fractured Surfaces of Hacksaw Blades”, AFTE Journal, Vol. 42(4), Fall 2010, pp. 323-334.

Validation of fracture matching method utilizing two consecutively manufactured hacksaw blades fractured eleven times and inter-compared. Two hundred fifty-three topical comparisons were conducted between forty-four fractured edges. Additional fractured hacksaw blade test specimens were produced and sent to examiners around the world yielding three hundred-thirty test results.

Weimar, B., et al., “Physical Match Examination of the Joint Faces of Adhesive PVC-Tapes”, AFTE Journal, Volume 42(3), Summer 2010, pp. 271-277.

A new method is presented for the physical match examination of the joint faces of cut and torn PVC insulation tapes. The combination of heat treatment, casting and comparison-light-microscopy with oblique light from opposite directions lead to results with a high conclusiveness. The method can be applied with the standard equipment in forensic toolmark laboratories

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Q1 Part 2: *What studies are needed to demonstrate the reliability and validity of these methods?*

The reliability of the science of firearm and tool mark identification has been established through numerous validation studies, most of which are cited on the AFTE website under the SWGGUN Admissibility Resource Kit (https://afte.org/resources/swggun-ark). These studies evaluate tools (such as firearms) produced using different manufacturing methods, and have consistently shown that qualified forensic practitioners are able to distinguish between tool marks produced using different tools. Additional validation studies may be appropriate to capture new manufacturing processes, as well as, responses from a larger segment of the forensic firearm and tool mark population.

Q2 Part 1: *Have studies been conducted to establish baseline frequencies of characteristics or features used in these pattern-based matching techniques? If not, how might such studies be conducted?*

There are two main types of toolmarks considered by the firearm and toolmark examiner; impressed and striated.

- Impressed toolmarks are, as the name implies, created when a harder tool working surface strikes, or comes into contact with, a softer surface with sufficient force to create an impression.
- Striated toolmarks are created by a sliding motion where a harder tool working surface, like the rifled bore of a firearm, or the edge of a screwdriver, makes contact with a softer material, like a fired bullet or edge of a metal door frame. Parallel lines, called striae, of varying width, are formed.

Pattern-Matching is the criteria for identification method of toolmark comparison and identification that is utilized by forensic laboratories throughout the US. The Association of Firearm and Toolmark Examiners (AFTE) Theory of Identification (adopted by AFTE in 1993 and slightly revised in May 2011) states the following:

AFTE Theory of Identification as it Relates to Toolmarks

1. The theory of identification as it pertains to the comparison of toolmarks enables opinions of common origin to be made when the unique surface contours of two toolmarks are in "sufficient agreement."

2. This "sufficient agreement" is related to the significant duplication of random toolmarks as evidenced by the correspondence of a pattern or combination of patterns of surface contours. Significance is determined by the comparative examination of two or more sets of surface contour patterns comprised of individual peaks, ridges and furrows. Specifically, the relative height or depth, width, curvature and spatial relationship of the individual peaks, ridges and furrows within one set of surface contours are defined and compared to the corresponding features in the second set of surface contours. Agreement is significant when the agreement in individual characteristics exceeds the best agreement demonstrated between toolmarks known to have been produced by different tools and is consistent with agreement demonstrated by toolmarks known to have been produced by the same tool. The statement that "sufficient agreement" exists between two toolmarks means that the agreement of individual characteristics is of a quantity and quality that the likelihood another tool could have made the mark is so remote as to be considered a practical impossibility.

3. Currently the interpretation of individualization/identification is subjective in nature, founded on scientific principles and based on the examiner's training and experience.

Attempts have been made in establishing a more objective criteria called Quantitative Consecutive Matching Striae (QCMS) which is in use by some firearm and toolmark examiners; however, it is not yet employed universally. QCMS is a way of describing in numerical terms an identification after traditional pattern matching methods have been employed. Once a pattern is found, the striations are tabulated and compared against the QCMS baseline. It should be noted that currently QCMS can only be employed when striated marks are involved and is not yet capable of capturing impressed marks which are routinely encountered by examiners in casework.

Creating baseline frequency studies is a difficult proposition in the field of Firearms and Toolmarks Examination due to the dynamic nature this type of evidence presents. Given there can be no degree of control over the absence or presence of affected surface areas that may contain baseline marks makes the use of a standard frequency database difficult. However, in recent years research has been and continues to be conducted using computer technology to begin formulating criteria and to assist in creating objective, measurable standards for identification within the field.

The following are literature citations, all published within the last five years, for some of the emerging research which has been performed. A short summary follows each citation.

Lilien, R. et al, "Applied Research and Development of a Three-Dimensional Topography System for Imaging and Analysis of Striated and Impressed Tool Marks for Firearm Identification using GelSight" Department of Justice Award 2013-R2-CX-K005, Document 248962, 2015

In the described work, we investigated and developed a novel, accurate, and low-cost system for structural 3D imaging and comparison of cartridge cases. We demonstrated the system's potential for increasing the quality and reducing the cost of forensic analyses. Several recent studies have called for improved imaging technology and matching algorithms to support firearm identification. Our project, named Top-Match, combines the recently developed GelSight high-resolution surface topography imaging system with state-of-the-art algorithms for matching structural features. Compared to competing technologies, our GelSight based system is fast, inexpensive, and not sensitive to the optical properties of the material being measured. This project aims to extend the system to measure and compare striated toolmarks (e.g., aperture shear), to integrate these marks into the scoring function, and to investigate matching algorithms for comparing 3D surface topographies captured using different imaging modalities (e.g. GelSight vs. confocal microscopy). The research work was completed by Cadre Research Labs, a scientific computing contract research organization, working in collaboration with GelSight Inc., a company formed by the MIT researchers who developed the GelSight surface topography imaging technology. The two companies collaborate closely with Todd Weller, a firearms identification specialist and Criminalist in the Oakland Police Department. We also worked with colleagues at NIST and at the International Forensic Science Laboratory & Training Centre in Indianapolis (Dr. James Hamby). We continue to work with Andy Smith (San Francisco PD), Chris Coleman (Contra Costa County Office of the Sheriff), and Karl Larsen (U. Illinois at Chicago). These collaborators continue to be excellent partners and provide both scans and constructive feedback. The results described below made use of a large set of new and previously collected test fires.

McClarin, D., "Adding an Objective Component to Routine Casework: Use of Confocal Microscopy for the Analysis of 9mm Caliber Bullets", AFTE Journal, Volume 47(3), Summer 2015, pp. 161-170.

The Alabama Department of Forensic Sciences (ADFS) procured a confocal microscope for the purpose of incorporating three-dimensional (3D) topographical analysis into routine casework. The purpose of employing such a technique was to assist the firearm and toolmark examiner by complementing routine analysis with an independent objective analysis. This article covered the research procedures conducted using confocal microscopy at the ADFS.

Spotts, R., et al., “Angular Determination of Toolmarks Using a Computer-Generated Virtual Tool”. Journal of Forensic Sciences, Volume 60(4), 2015, pp. 878-893.

A blind study to determine whether virtual toolmarks created using a computer could be used to identify and characterize angle of incidence of physical toolmarks was conducted. Six sequentially manufactured tips and one random screwdriver were used to create toolmarks at different angles. An apparatus controlled tool angle. Resultant toolmarks were randomly coded and sent to the researchers who scanned both tips and toolmarks using an optical profilometer to obtain 3D topography data. Developed software was used to create virtual marks based on the tool topography data. Virtual marks generated at angles from 30 to 85 degrees (5 degree increments) were compared to physical toolmarks using a statistical algorithm. Twenty of twenty toolmarks were correctly identified by the algorithm. On average the algorithm estimated the correct angle of incidence by -6.12 degrees. This study presents the results, their significance, and offers reasons for the average misidentifications.

Spotts, R., and Chumbley, S., “Objective Analysis of Impressed Chisel Toolmarks”, Journal of Forensic Sciences, Volume 60(6), 2015, pp. 1436-1440.

Historical and recent challenges to the practice of forensic examination have created a driving force for the formation of objective methods for toolmark identification. In this study, fifty sequentially manufactured chisels were used to create impression toolmarks in lead (500 toolmarks total). An algorithm previously used to statistically separate known matching and nonmatching striated screwdriver marks and quasi-striated plier marks was used to evaluate the chisel marks. Impression evidence, a more complex form of toolmark, poses a more difficult test for the algorithm that was originally designed for striated toolmarks. Results show in this instance that the algorithm can separate matching and nonmatching impression marks, providing further validation of the assumption that toolmarks are identifiably unique.

Riva, F. and Champod, C., “Automatic Comparison and Evaluation of Impressions Left by a Firearm on Fired Cartridge Cases”, Journal of Forensic Sciences, Vol. 59(3), May 2014, pp. 637-647.

This paper reported on an automated study of marks contained on fired cartridge cases from seventy-nine (79) 9mm Luger caliber pistols were conducted using 3D surface topography analysis and coupled to a bivariate evaluative model to assign likelihood ratios. The purpose of this analytic system was to conduct an objective comparative analysis with a robust statistical evaluation basis to the results. The system reflected a very high discriminating ability between the known and non-known specimens. This study also reflected very low rates of misleading evidence depending on the firearm considered.

Yammen, S., and Muneesawang, P., "Cartridge Case Image Matching using Effective Correlation Area Based Method", Forensic Science International, Issue 229, 2013, pp. 27-42.

A firearm leaves a unique impression on fired cartridge cases. The cross-correlation function plays an important role in matching the characteristic features on the cartridge case found at the crime scene with a specific firearm, for accurate firearm identification. This paper proposes that the computational forensic techniques of alignment and effective correlation area-based approaches to image matching are essential to firearm identification. Specifically, the reference and the corresponding cartridge cases are aligned according to the phase-correlation criterion on the transform domain. The informative segments of the breech face marks are identified by a cross-covariance coefficient using the coefficient value in a window located locally in the image space. The segments are then passed to the measurement of edge density for computing effective correlation areas. Experimental results on a new dataset show that the correlation system can make use of the best properties of alignment and effective correlation area-based approaches, and can attain significant improvement of image-correlation results, compared with the traditional image-matching methods for firearm identification, which employ cartridge-case samples. An analysis of image-alignment score matrices suggests that all translation and scaling parameters are estimated correctly, and contribute to the successful extraction of effective correlation areas. It was found that the proposed method has a high discriminant power, compared with the conventional correlator. This paper advocates that this method will enable forensic science to compile a large-scale image database to perform correlation of cartridge case bases, in order to identify firearms that involve pairwise alignments and comparisons.

Zhang, S. and Chumbley, L.S., "Manipulative Virtual Tools for Tool Mark Characterization", NCJRS Document #241443, Award # 2009-DN-R-119, March 2013.

This paper describes research on the development of virtual toolmarks by a 3-D computer simulation that would allow for the development of highly predictable toolmark characterizations. Initial study involved the production of test toolmarks by six screwdriver tips that were then compared by a previously developed statistical algorithm.

Preliminary experimental results indicated that the use of a manipulative, virtual tool could provide quantitative data for the characterization of tool marked surfaces that would improve the scientific basis of toolmark identification.

Song, J., et al., "Development of Ballistics Identification- from Image Comparison to Topography Measurement in Surface Metrology", Measurement Science and Technology, Volume 23, Number 054010, March, 2012.

This was a systematic study of direct measurement and correlation of surface topography on fired bullet markings. Based on this on this system, a prototype for bullet signature measurement and correlation was developed that has demonstrated superior correlation results for bullet signature identifications.

Chu, W., et al., "Selecting Valid Correlation Areas for Automated Bullet Identification System Based on Striation Detection", Journal of Research of the National Institute of Standards and Technology, Volume 116, Number 3, May-June 2011.

This paper detailed a study on fired bullet markings using automated bullet identification systems that employ an edge detection algorithm and selection process that locates the edge points of significant toolmark features was conducted. Results of this study validated the differentiation ability of individual characteristics if a proper striation threshold length could be established.

Weavers, G., et al, "A Comprehensive Statistical Analysis of Striated Tool Mark Examinations, Part 2: Comparing Known Matches and Known Non- Matches using Likelihood Ratios", AFTE Journal, Volume 43(2), Spring 2011, pp. 137-145.

A potential model for increasing the objectivity in the interpretation of toolmarks is explored using consecutively matching striae (CMS) and Bayesian inference. Given the nature of the data, standard statistical thinking suggests that Bayesian inference is likely to be the most powerful method of interpretation. The unavoidable paucity of data for high CMS runs for the known non-match condition is handled using a small advance in modelling. The resulting likelihood ratios show some, but incomplete separation between the known match and known non-match conditions. Although promising, the resulting incomplete separation between known match and known non-match is thought to represent limitations of the CMS summary of the complete pattern and limitations of the modelling used.

Baldwin, et al, "Statistical Tools for Forensic Analysis of Toolmarks", Ames Laboratory, Iowa State University, Report IS-5160, 2011

Recovery and comparison of toolmarks, footprint impressions, and fractured surfaces connected to a crime scene are of great importance in forensic science. The purpose of this project is to provide statistical tools for the validation of the proposition that particular manufacturing processes produce marks on the work-product (or tool) that are substantially different from tool to tool. The approach to validation involves the collection of digital images of toolmarks produced by various tool manufacturing methods on produced work-products and the development of statistical methods for data reduction and analysis of the images. The developed statistical methods provide **a** means to objectively calculate a "degree of association" between matches of similarity produced toolmarks. The basis for statistical method development relies on "discriminating criteria" that examiners use to identify features and spatial relationships in their analysis of forensic samples. The developed data reduction algorithms utilize the same rules used by examiners for classification and association of toolmarks.

Q2 Part 2: *What publicly accessible databases exist that could support such studies? What closed databases exist? Where such databases exist, how are they controlled and curated?*

Databases designed to establish the baseline frequencies of characteristics or features used to establish identity for forensic firearm and toolmark comparisons currently do not exist.

Q2 Part 3: *If studies have not been conducted, what conclusions can and cannot be stated about the relationship between the crime scene evidence and a known suspect or tool (e.g., firearm)?*

The conclusions that can be rendered between two toolmarks are Identification, Elimination, Inconclusive and Unsuitable, and are defined below:

AFTE Range of Conclusions

Identification: Agreement of all discernible class characteristics and sufficient agreement of a combination of individual characteristics where the extent of agreement exceeds that which can occur in the comparison of toolmarks made by different tools and is consistent with the agreement demonstrated by toolmarks known to have been produced by the same tool.

Inconclusive:
A. Agreement of all discernible class characteristics and some agreement of individual characteristics, but insufficient for an identification.
B. Agreement of all discernible class characteristics without agreement or disagreement of individual characteristics due to an absence, insufficiency, or lack of reproducibility.
C. Agreement of all discernable class characteristics and disagreement of individual characteristics, but insufficient for an elimination.

Elimination:
Significant disagreement of discernible class characteristics and/or individual characteristics.

Unsuitable:
Unsuitable for examination.

Q3: *How is performance testing (testing designed to determine the frequency with which individual examiners obtain correct answers) currently used in forensic laboratories? Are performance tests conducted in a blind manner? How could well-designed performance testing be used more systematically for the above pattern-based techniques to establish baseline error rates for individual examiners? What are the opportunities and challenges for developing and employing blind performance testing? What studies have been published in this area?*

Many forensic laboratories require competency testing prior to authorization for a forensic practitioner to independently evaluate evidence.

Proficiency testing is a valuable component to measure the performance of individual examiners and the procedures, methods and practices utilized by the laboratory. Forensic laboratory accreditation bodies generally require each laboratory participate annually in proficiency tests provided by an external vendor, if available. Currently, the requirements do not mandate that each examiner participates in an external proficiency test, though most forensic laboratories exceed this standard and require that each examiner participates in an externally provided proficiency test. There are currently two (2) vendors that provide external proficiency tests in the area of Firearms and Toolmark Identification. One of the vendors does not provide, report or publish a statistical evaluation of the compiled results submitted at this time; however, laboratories can review the test summary provided for a particular test to extrapolate this information. The other vendor is offering a proficiency testing scheme with calculations of statistics relevant to the forensic science and legal communities to include false positive and false negative error rates, as well as sensitivity and specificity for each test.

Angela Stroman, in the "Declared vs. Blind Testing" section of her recent research paper entitled "Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double-Blind Format" AFTE Journal, 46(2), Spring 2014, pp. 157-175, did an especially cogent job of describing the current status of proficiency testing in firearm and toolmark identification, and for that reason, it is attached here in its entirety.

Attachment (Click on icon to open document):

Q4: *What are the most promising new scientific techniques that are currently under development or could be developed in the next decade that would be most useful for forensic applications? Examples could include hair analysis by mass spectrometry, advances in digital forensics, and phenotypic DNA profiling.*

There are currently no quantitative criteria widely utilized for the identification of toolmarks; however, within the past 5 years, there has been significant progress in this area through research in the optical topographical analysis of toolmarks. This is the most promising new technique in the area of firearm and toolmark identification.

The extent of progress in the optical topographical analysis of toolmarks was brought into sharp focus recently with the formation, by RTI International Forensic Technology Center of Excellence, in partnership with the National Institute of Justice (NIJ) and the National Institute of Standards and Technology (NIST), of the "Forensic Optical Topography Working Group". The final report, dated April 17, 2015, on their March 17-18, 2015 meeting, is attached. In the "Overview" portion of this report, it is stated that "this working group seeks to establish the applicability and validity of optical topography to forensic investigations and to produce publications or training materials that can be accessed by the entire forensic community and that will provide guidance to practitioners on applications and recommendations for further research, development, and capacity assistance. Primarily, the working group will examine optical topography instruments, methods, data systems, and analysis from a practical perspective for ballistic and tool mark identification".

Attachment (Click on icon to open document):

Q5: *What standards of validity and reliability should new forensic methods be required to meet before they are introduced in court?*

Validation is the process by which the scientific community acquires the necessary information to (a) assess the ability of a procedure to obtain reliable results, (b) determine the conditions under which such results can be obtained, and (c) define the limitations of the procedure. New forensic methods which have not been scientifically validated or has been validated but not

adopted for use in the field of forensic science should undergo a developmental validation process before they are introduced in court.
Developmental Validation should include:

1. Literature references: Review of publications, academic materials, etc. involving the technique or procedure being validated.
2. Simulated casework samples which are representative of the samples routinely analyzed using the technique or procedure.
3. Accuracy/Precision Studies: The results must demonstrate that the method is capable of delivering the level of accuracy and precision required for the particular application of the method. The accuracy (proximity to accepted values) and precision (acceptable level of variability) must be demonstrated to be acceptable for forensic casework.
4. Reproducibility: The test must be reproducible by another individual using the original test documentation.
5. Specificity: Where applicable, the method should be demonstrated to yield results which are specific to the items analyzed.
6. Sensitivity Studies: The sensitivity of the method should be demonstrated when relevant to the validation process.

<u>A new technique or method</u> requires more thought and subsequent testing to properly satisfy validity and reliability issues. By way of an example, recent and rapid developments have taken place in the field or digital imaging of fired bullets and cartridge cases. A comparison of images of these items taken through a traditional optical microscope with digital images of the same objects generated with this ‘new’ technology are visually striking. [See **Figure 1** and **Figure 2**] So much more detail becomes visible in the toolmarks on these ballistic items. Moreover, previous problems with specular reflections (“hot spots”) with traditional illumination of shiny surfaces are totally obviated with these digital imaging systems. Conversely, areas that are dark under normal illumination are easily seen as gray scale images with these same digital systems. The two attached figures show a cartridge case comparison and a bullet comparison with a traditional optical comparison microscope and one of the current digital scanning systems. One might argue that the substantially superior nature of the images generated by the digital scanning system are self-evident or self-authenticating, and that a court should easily be able to see the improvement offered by such a digital scanning system. But lacking expertise in firearms and toolmark examination on the part of a judge, an alternate and more appropriate procedure for validity and reliability, suitable for peer review using this example of a ‘new’ technique, would be as follows:

1. Select a polygonally-rifled firearm such as a Glock or H/K P2000, and ensure (through a subsequent bore cast) that the bore is unique by minimally lapping it with fine grain SiC in a liquid base. [Note: this type of barrel is chosen because it is often very difficult to impossible to match test-fired bullets under the conventional optical comparison microscope]

   The lapping process will produce micro-imperfections in the bore in a random manner thereby rendering the barrel unique.

2. Prepare indexed, test-fired bullets ***<u>after</u>*** multiple shots (5-10 shots) to assure that the “settling in” process is complete.

3. Verify that these bullets can*not* be definitively matched using a state-of-the-art optical comparison microscope.

4. Prepare photomicrographs showing the best (if any) areas of marginal agreement on these test-fired bullets.

5. Scan and re-examine all test-fired bullets using one of the state-of-the-art digital imaging systems such as *Evofinder*, *IBIS Trax-HD3D*, or *LUCIA Bal-Scan*.

6. Record the best matches with digital imaging system.

7. Prepare side-by-side comparisons between the results for the *same* areas with the optical comparison microscope and the digital imaging system.

8. Repeat the experiment with other barrels producing difficult to impossible to match test-fired bullets.

Validity and reliability in this example are established with the repeated success of the digital imaging system with its demonstrated ability to make visible unique striae patterns *not* discernible with the traditional optical comparison microscope. Subsequent peer review by the relevant scientific community would also represent an important consideration if, and when, critics raise a legal challenge to the use of this new technology.

FIGURE 1:
CARTRIDGE CASE COMPARISON

FIGURE 2:
BULLET COMPARISON

Note the dark, soot-stained surface of these two bullets when viewed and photographed under the optical comparison microscope. This dark material presents no problem for the digital imaging system employed here. Moreover, a much better comparison appears in the digital image on the right.

Q6 Part 1: *Are there scientific and technology disciplines other than the traditional forensic science disciplines that could usefully contribute to and/or enhance the scientific, technical and/or societal aspects of forensic science?*

For many years the Firearm and Toolmark community has been left to their own intrigue and dedication to investigate unanswered questions within the discipline as the primary source of research. However, as will be seen in the literature that is cited in this response, one will see that collaboration with Universities and research scientists has become more prevalent. Iowa State University, John Jay College, University of California at Davis are just a few of those universities that have taken up specific research in the field of Firearm and Toolmark Examination. NIST researchers have also contributed significantly to this research effort.

In the most recent history of research within the discipline, our profession has begun collaboration with computer scientists utilizing machine learning algorithms. Machine learning is a sub discipline of computer science that seeks to teach computers how to recognize (and compare) patterns. Since the comparison of toolmarks is the comparison of patterns, the collaboration between firearms and toolmark examiners and machine learning computer scientists is a collaboration that has started to produce interesting research papers.

Metrology is a second discipline that has enhanced the science of firearm and toolmark identification. Metrology is the science of measurement. In order to use computer machine learning algorithms to compare toolmarks, the toolmarks must be accurately measured. This is where the metrology scientists have (and will) help the forensic community evaluate and implement the best technology for the task at hand.

Q6 Part 2: *What mechanisms could be employed to encourage further collaboration between these disciplines and the forensic science community?*

The Organization of Scientific Area Committees, established by the National Institute of Standards and Technology (NIST) has as a primary goal to answer this very question. The majority of forensic science disciplines have now been brought together within one entity with a purpose of establishing scientifically sound standards of practice within each discipline. The ability to share knowledge and research and to collaborate between like disciplines is now a greater possibility, which will only serve to enhance the technical and societal impacts of forensic science.

Q7: *Please share any additional comments.*

On June 14, 2011, AFTE submitted a 94 page response to 25 foundational questions on firearm and toolmark examination submitted by the Subcommittee on Forensic Science (SoFS), Research, Development, Testing, & Evaluation Interagency Working Group (RDT&E IWG). This response consisted of a compilation of numerous references, with abstracts, that AFTE felt provided the scientific underpinnings of forensic firearm and toolmark identification. The entire document can be accessed by going to the AFTE website and looking under the "Resources" tab and then "AFTE Position Documents".

The SoFS RDT&E IWG felt that if a forensic specialty, like firearm and toolmark identification, could respond to their 25 questions by providing sound, peer-reviewed, references that they probably rested on firm scientific underpinnings. AFTE was one of the first, if not the first, to provide an underpinning compilation list to the RDT&E IWG.

The SoFS RDT&E IWG intended to have someone evaluate these articles to determine whether or not they actually did provide a firm scientific underpinning. However, despite good intentions, they were not able to have this evaluation done prior to the expiration of their charter.

In late 2014 or early 2015, however, it was announced that the American Association for the Advancement of Science (AAAS) had been funded to conduct a quality and gap analysis of the underpinning compilations submitted to the SoFS RDT&E IWG by ten forensic disciplines, including firearms and toolmarks. To date, there has been no public announcement regarding the state of these evaluations by AAAS.

We have attached the letter written to AAAS, a copy of the cover letter the entire compilation provided by AFTE to SoFS/RDT&E IWG.

Attachment (Click on icon to open document):

REPORT TO THE PRESIDENT
Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods

September 2016

REFERENCES

DNA

1. Adams, E.G. and Wraxall, B.G. Phosphatases in Body Fluids: The Differentiation of Semen and Vaginal Secretions, Forensic Science (1974) 3: 57-62.
2. Alaeddini, R. Forensic Implications of PCR Inhibition – A review, Forensic Science International Genetics, 6 (3), (2012) 297 – 305; doi: 10.1016/j.fsigen.2011.08.006
3. Allard, M. W., Wilson, M., Monson, K., Budowle, B. Control region sequences for Hispanic individuals in the SWGDAM forensic mtDNA data set. Journal of Forensic Science (2006) 51:566-573.
4. Allard, M., Miller, K.W.P., Wilson, M., Monson, K. and Budowle, B.: Characterization of caucasian haplogroups present in the SWGDAM forensic mtDNA dataset for 1,771 human control region sequences, Journal of Forensic Sciences (2002) 47:1215-1223.
5. Allard, M.A., Polanskey, D. Miller, K.W.P., Wilson, M.R., Monson, K.L., and Budowle, B. Characterization of human control region sequences of the African American SWGDAM forensic mtDNA data set, Forensic Science International (2005) 148:169-179.
6. Amorim A. A cautionary note on the evaluation of genetic evidence from uniparentally transmitted markers. Forensic Science International: Genetics (2008) 2:376–378.
7. An, J.H., Shin, K.J., Choi, A., Yang, W.I., Lee, H.Y., DNA methylation-based age estimation in the forensic field. Korean Journal of Legal Medicine, 37(1), pp.1-8.
8. Anderson, S., Bankier, A.T., Barrell, B.G., de Bruijn, M.H., Coulson, A.R., Drouin, J., Eperon, I.C., Nierlich, D.P., Roe, B.A., Sanger, F., Schreier, P.H., Smith, A.J., Staden, R., and Young, I.G. Sequence and organization of the human mitochondrial genome, Nature (1981) 290:457–465.
9. Andrews, R.M., Kubacka, I., Chinnery, P.F., Lightowlers, R.N., Turnbull, D.M., and Howell, N. Reanalysis and revision of the Cambridge Reference Sequence for human mitochondrial DNA, Nature Genetics (1999) 23:147.
10. Anthonioz, A. and Champod, C., 2014. Integration of pore features into the evaluation of fingerprint evidence. Journal of forensic sciences, 59(1), pp.82-93.
11. Ayadi, I., Mahfoudh-Lahiani, N., Makni, H., Ammar-Keskes, L., and Reba, A. Combining autosomal and Y-Chromosomal Short Tandem Repeat Data in paternity Testing with Male Child: Methods and Application. Journal of Forensic Science (2007) 52(5):1068-72.
12. Ayres, K.L. (2000) Relatedness testing in subdivided populations. Forensic Sci. Int. 114:107-115.
13. Baechtel, F.S. The Identification and Individualization of Semen Stains. Forensic Science Handbook (1988) 2:347-392.
14. Baechtel, F.S., Jung, J.C. and Terrell, L.D. Use of an enzyme linked immunosorbent assay for the detection of p30 in questioned semen stains. Proceedings of the International Symposium on Forensic Immunology, FBI Laboratory, Washington, D.C., 1986.
15. Balding, D.J. and Buckleton, J. (2009) Interpreting low template DNA profiles, Forensic Science International: Genetics 4(1):1-10.

16. Balding, D.J. and Nichols, R.A. DNA profile match probability calculations; how to allow for population stratification, relatedness, database selection and single bands, Forensic Science International (1994) 64:125-140.
17. Balding, D.J. and Steele, C.D., 2015. Weight-of-evidence for Forensic DNA Profiles. John Wiley & Sons.
18. Ballantyne, K.N., Goedbloed, M., Fang, R., Schaap, O., Lao, O., Wollstein, A., Choi, Y., van Duijn, K., Vermeulen, M., Brauer, S., Decorte, R., Poetsch, M., von WurmbSchwark, N., de Knijff, P., Labuda, D., Vézina, H., Knoblauch, H., Lessig, R., Roewer, L., Ploski, R., Dobosz, T., Henke, L., Henke, J., Furtado, M.R., and Kayser, M., Mutability of Y-chromosomal microsatellites: rates, characteristics, molecular bases, and forensic implications. American Journal of Human Genetics, 2010, 87:341-353.
19. Ballantyne, K.N., Keerl, V., Wollstein, A., Choi, Y., Zuniga, S.B., Ralf, A., Vermeulen, M., de Knijff P., and M. Kayser. (2012) "A new future of forensic Y-chromosome analysis: rapidly mutating Y_STRs for differentiating male relatives and paternal lineages." Forensic Sci Int Genet 6(2):208-18.
20. Bandelt, H.J. and Parson, W. Consistent treatment of length variants in the human mtDNA control region: a reappraisal. International Journal of Legal Medicine (2008) 122:11-21.
21. Bär, W., Brinkmann, B., Budowle, B., Carracedo, A., Gill, P., Lincoln, P., Mayr, W. R., and Olaisen, B. (1997) DNA recommendations – further report of the DNA Commission of the ISFH regarding the use of short tandem repeat systems. Int. J. Legal Med. 110: 175-176.
22. Bär, W., Brinkmann, B., Lincoln, P., Mayr, W. R., and Rossi, U. (1994) DNA recommendations – 1994 report concerning further recommendations of the DNA Commission of the ISFH regarding PCR-based polymorphisms in STR (short tandem repeat) systems. Int. J. Legal Med. 107: 159-160.
23. Bedrosian, J.L. Development of a radial gel diffusion technique for the identification of urea in urine stains, Journal of Forensic Sciences (1984) 29:601-606.
24. Beeler, M.F., Koa, Y.S., Todd-Sanford clinical diagnosis, W.B. Saunders Co. (1974) Chapter 17.
25. Bendall, K.E., Macaulay, V.A., Sykes, B.C. Variable levels of a heteroplasmic point mutation in individual hair roots, American Journal of Human Genetics (1997) 61:1303-1308.
26. Bendall, K.E., Sykes, B.C. Length heteroplasmy in the first hypervariable segment of the human mtDNA control region, American Journal of Human Genetics (1995) 57:248-256.
27. Bender, K., Farfán, M.J., and Schneider, P.M. (2004) Preparation of degraded human DNA under controlled conditions, Forensic Science International 139(2-3):135-140.
28. Benschop, C., Haned, H., and Sijen, T. (2013) Consensus and pool profiles to assist in the analysis and interpretation of complex low template DNA mixtures, International Journal of Legal Medicine 127(1):11-23.
29. Benschop, C.C., van der Beek, C.P., Meiland, H.C., van Gorp, A.G., Westen, A.A., and Sijen, T. (2011) Low template STR typing: effect of replicate number and consensus method on genotyping reliability and DNA database search results, Forensic Science International: Genetics 5(4):316-328.
30. Berger, C. and Parson W. Mini-midi-mito: Adapting the amplification and sequencing strategy of mtDNA to the degradation state of crime scene samples. Forensic Science International: Genetics (2009) 3:149–153.
31. Bhatia, G., Patterson, N., Sankararaman, S., and Price, A. Estimating and interpreting FST: The impact of rare variants, Genome Research (2013) 23:1514-1521.
32. Bieber, F.R., 2006. Turning base hits into earned runs: improving the effectiveness of forensic DNA data bank programs. The Journal of Law, Medicine & Ethics, 34(2), pp.222-233.
33. Bieber, F.R., Brenner, C.H. and Lazer, D., 2006. Finding criminals through DNA of their relatives. Science, 312, pp.315-6.
34. Bieber, Frederick R., John S. Buckleton, Bruce Budowle, John M. Butler and Michael D. Coble. "Evaluation of forensic DNA mixture evidence: protocol for evaluation, interpretation, and statistical calculations using the combined probability of inclusion." *BMC Genetics*.

35. Biedermann, A., Taroni, F., 2011. Bayesian networks for evaluating forensic DNA profiling evidence: A review and guide to literature. Forensic Science International: Genetics, 6(2), pp.147-157.
36. Biedermann, A., Vuille, J., Taroni, F., 2014. DNA, statistics and the law: a cross-disciplinary approach to forensic inference. Frontiers in Genetics. 5, pp.136.
37. Bill, M., Gill, P., Curran, J., Clayton, T., Pinchin, R., Healy, M., and Buckleton, J. (2005) PENDULUM-a guideline-based approach to the interpretation of STR mixtures. Forensic Sci. Int. 148: 181-189.
38. Bille TW, Weitz SM, Coble MD, Buckleton J, Bright J-A. Comparison of the performance of different models for the interpretation of low level mixed DNA profiles. *Electrophoresis*. 2014; 3125–33.
39. Brenner, C.H. Multiple mutations, covert mutations and false exclusions in paternity casework, International Congress Series 1261 (2004), 112-114.
40. Brenner, C.H. Understanding Y haplotype matching probability, Forensic Science International: Genetics (2014) 8:233-243.
41. Bright, J-A., Taylor D., Curran, J.S., and Buckleton, J.S. “Searching mixed DNA profiles directly against profile databases.” *Forensic Science International: Genetics*. Vol. 9 (2014):102-10
42. Bright, J.A. et al. “Developmental validation of STRmix™, expert software for the interpretation of forensic DNA profiles.” *Forensic Sci Int Genet.* 2016.
43. Bright, J.A., Gill, P., and Buckleton, J. (2012) Composite profiles in DNA analysis, Forensic Science International: Genetics 6(3):317-321.
44. Buckleton, J., 2005. A framework for interpreting evidence. Forensic DNA evidence interpretation, pp.27-63.
45. Buckleton, J., Curran, J. A discussion of the merits of random man not excluded and likelihood ratios, Forensic Science International: Genetics (2008) 2:343-348.
46. Buckleton, J., Krawczak, M., and Weir, B. The interpretation of lineage markers in forensic DNA testing, Forensic Science International: Genetics (2011) 5:78-83.
47. Buckleton, J.S., Curran, J.M., Gill, P. (2007) Towards understanding the effect of uncertainty in the number of contributors to DNA stains. Forensic Sci. Int. Genet. 1:20-28.
48. Buckleton, J.S., Evett, I.W., Weir, B.S. (1998) Setting bounds for the likelihood ratio when multiple hypotheses are postulated. Sci. Justice. 38: 23-26.
49. Budowle, B., Allard, M., Fisher, C.L., Isenberg, A.R., Monson, K.L., Stewart, J.E.B., Wilson, M.R. and Miller, K.W.P.: HVI and HVII mitochondrial DNA data in Apaches and Navajos. International Journal of Legal Medicine. (2002) 166:212-215.
50. Budowle, B., Baechtel, F.S., Chakraborty, R. Partial matches in heterogeneous offender databases do not call into question the validity of random match probability calculations, International Journal of Legal Medicine (2009) 123(1):59-63.
51. Budowle, B., Chakraborty, R., Carmody, G., Monson, K.L. (2000) Source attribution of a forensic DNA profile. Forensic Sci. Commun. 2(3).
52. Budowle, B., Eisenberg, A.J., and van Daal, A. (2009) Validity of low copy number typing and applications to forensic science, Croatian Medical Journal 50(3):207-217.
53. Budowle, B., Ge, J., Aranda, X.G., Planz, J.V., Eisenberg, A.J., Chakraborty, R. Texas Population substructure and Its Impact on Estimating the Rarity of Y STR Haplotypes from DNA Evidence. Journal of Forensic Science (2009) 54(5): 1016-21.
54. Budowle, B., Ge, J., Lowe, J., Lai, C., Wong, H.Y., Law, G., Tan, W.F., Chang, Y.M., Perumal, R., Keat, P.Y., Mizumo, N., Kasai, K., Sekiguchi, K., and Chakraborty, R. The effects of Asian population substructure on Y STR forensic analysis, Legal Medicine (2009b) 11:64-69.
55. Budowle, B., Gyllensten, U., Chakraborty, R., Allen, M. Forensic analysis of the mitochondrial coding region and association to disease, International Journal of Legal Medicine (2005) 119:314-315.
56. Budowle, B., Monson, K.L., Chakraborty, R. Estimating minimum allele frequencies for DNA profile frequency estimates for PCR-based loci, International Journal of Legal Medicine (1996) 108:173-176.

57. Budowle, B., Moretti, T.R., Baumstark, A.L., Defenbaugh, D.A., and K.M. Keys. "Population data on the thirteen CODIS core short tandem repeat loci in African Americans, U.S. Caucasians, Hispanics, Bahamians, Jamaicans, and Trinidadians." *Journal of Forensic Sciences*, Vol. 44, No. 6 (1999): 1277-86.
58. Budowle, B., Moretti, T.R., Keys, K.M., Koons, B.W., and J.B. Smerick. "Validation studies of the CTT STR multiplex system." *Journal of Forensic Sciences,* Vol. 42, No. 4 (1997): 701-7.
59. Budowle, B., Onorato, A.J., Callaghan, T.F., Della Manna, A., Gross, A.M., Guerrieri, R.A., Luttman, J.C., McClure, D.L. (2009) Mixture interpretation: defining the relevant features for guidelines for the assessment of mixed DNA profiles in forensic casework. J. Forensic Sci. 54: 810-821.
60. Budowle, B., Polanskey, D., Fisher, C., Den Hartog, B., Kepler, R., and Elling, J. Automated Alignment and Nomenclature for Consistent Treatment of Polymorphisms in the Human Mitochondrial DNA Control Region, Journal of Forensic Science (2010) 55(5):1190-1195.
61. Budowle, B., Shea, B., Niezgoda, S., Chakraborty, R. CODIS STR loci data from 41 sample populations, Journal of Forensic Sciences (2001) 46(3):453-489.
62. Budowle, B., Wilson, M.R., DiZinno, J.A., Stauffer, C., Fasano, M.A., Holland, M.M., Monson, K.L. Mitochondrial DNA regions HVI and HVII population data, Forensic Science International (1999) 103:23-35.
63. Butler, J.M. "Chapter 13: Coping with Potential Missing Alleles." *Advanced Topics in Forensic DNA Typing: Interpretation*. Waltham, MA: Elsevier/Academic, 2015. 333-48.
64. Butler, J.M. (2001) Forensic DNA Typing: Biology and Technology behind STR Markers. Academic Press, London.
65. Butler, J.M. (2005) Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers (2nd Edition). Elsevier Academic Press, New York.
66. Butler, J.M. (2010) Fundamentals of Forensic DNA Typing. Elsevier Academic Press, San Diego.;
67. Butler, J.M. (2012) Advanced Topics in Forensic DNA Typing: Methodology. Elsevier Academic Press, San Diego.
68. Butler, J.M. (2015) Advanced Topics in Forensic DNA Typing: Interpretation. Elsevier Academic Press, San Diego.
69. Butler, J.M. "The future of forensic DNA analysis." *Philosophical Transactions of the Royal Society B,* 370: 20140252 (2015).
70. Butler, J.M. and Schoske, R. Duplication of DYS19 flanking regions in other parts of the Y chromosome, International Journal of Legal Medicine (2004) 118:178-183.
71. Butler, J.M. Quality Assurance and Validation. In: Advanced Topics in Forensic DNA Typing: Methodology. Elsevier, 2011.
72. Butler, J.M., Decker, A.E., Kline, M.C., and Vallone, P.M. Chromosomal duplications along the Y-Chromosome and their potential impact on Y-STR interpretation, Journal of Forensic Sciences (2005) 50:853-859.
73. Butler, J.M., Shen, Y., McCord, B.R. The development of reduced size STR amplicons as tools for analysis of degraded DNA, Journal of Forensic Sciences (2003) 48(5):1054-1064.
74. Caddy, B., Taylor, G.R., and Linacre, A.M.T. (2008) A review of the science of low template DNA analysis.
75. Calloway, C.D., Reynolds, R.L., Herrin, G.L. Jr., Anderson, W.W. The frequency of heteroplasmy in the HVII Region of mtDNA differs across tissue types and increases with age, American Journal of Human Genetics (2000) 66:1384-1397.
76. Camps, F.E., editor. Gradwohl's Legal Medicine. (1968).
77. Carracedo, A., Bar, W., Lincoln, P., Mayr, W., Morling, N., Olaisen, B., Schneider, P., Budowle, B., Brinkman, B., Gill, P., Holland, M., Tully, G., and Wilson, M. DNA Commission of the International Society for Forensic Genetics: Guidelines for mitochondrial DNA typing. Forensic Science International (2000) 110:79-85.

78. Chakraborty, R. Sample size requirements for addressing the population genetic issues of forensic use of DNA typing, Human Biology (1992) 64(2):141–159.
79. Chakraborty, R. Statistical interpretation of DNA typing data, American Journal of Human Genetics (1991) 49(4):895-897, 899–903.
80. Chakraborty, R., Kidd, K.K. The utility of DNA typing in forensic work, Science (1991) 254:1735–1739.
81. Champod, C., 2015. Fingerprint identification: advances since the 2009 National Research Council report. Phil. Trans. R. Soc. B, 370(1674).
82. Chang, T.S.K. Seminal Cytology, Proceedings of a Forensic Science Symposium on the Analysis of Sexual Assault Evidence, U.S. Department of Justice, Washington, D.C. (1983) pp. 45-56.
83. Clayton, T.M., Whitaker, J.P., Sparkes, R., Gill, P. (1998) Analysis and interpretation of mixed forensic stains using DNA STR profiling. Forensic Sci. Int. 91: 55-70.
84. Clopper, C. and Pearson, E. The use of confidence or fiducial limits illustrated in the case of binomial, Biometrika (1934) 26:404-413.
85. Coble, M.D., Bright, J.A., Buckleton, J.S., and J.M. Curran. "Uncertainty in the number of contributors in the proposed new CODIS set." *Forensic Science International Genetics*, Vol. 19 (2015): 207-11.
86. Coble, M.D., Just, R.S., O'Callaghan, J.E., Letmanyi, I.H., Peterson, C.T., Irwin, J.A., Parsons, T.J. Single nucleotide polymorphisms over the entire mtDNA genome that increase the power of forensic testing in Caucasians, International Journal of Legal Medicine, 2004, 118:137-46.
87. Coble, M.D., Vallone, P.M., Just, R.S., Diegoli, T.M., Smith, B.C., Parsons, T.J. Effective strategies for forensic analysis in the mitochondrial DNA coding region, International Journal of Legal Medicine, 2006, 120:27-32.
88. Cockerton, S., McManus, K., and Buckleton, J. Interpreting lineage markers in view of subpopulation effects, Forensic Science International: Genetics (2012) 6:393-397.
89. Comas, D., Pääbo, S., Bertranpetit, J. Heteroplasmy in the control region of human mitochondrial DNA, Genome Research (1995) 5:89-90.
90. Committee on DNA Forensic Science, National Research Council. An Update: The Evaluation of Forensic DNA Evidence, National Academy Press, Washington, DC, 1996.
91. Committee on DNA Forensic Science, National Research Council. DNA Technology in Forensic Science. National Academy Press, Washington, DC, 1992.
92. Corbin, S., 2015. Forensic examination of latent prints using Raman spectroscopy. Student Presentation, Boise State University.
93. Cox, M. A Study of the Sensitivity and Specificity of Four Presumptive Tests for Blood, Journal of Forensic Sciences (1991) 36(5):1503-1511.
94. Crouse, C.A., Rogers, S., Amiott, E., Gibson, S., and Masibay, A. Analysis and interpretation of short tandem repeat microvariants and three-banded allele patterns using multiple allele detection systems, Journal of Forensic Sciences (1999) 44:87–94.
95. Croxton, R., Baron, M., Butler, D., Kent, T., Sears, V., 2010. Variation in amino acid and lipid composition of latent fingerprints. Forensic Science International, 199(1-3), pp.93-102.
96. de Keijser, J.W., Malsch, M., Luining, E.T., Kranenbarg, M.W., and D.J.H.M. Lenssen. "Differential reporting of mixed DNA profiles and its impact on jurists' evaluation of evidence: An international analysis." *Forensic Science International: Genetics*, Vol. 23 (2016): 71-82.
97. Devlin, B. (1993) Forensic inference from genetic markers. Stat. Methods Med. Res. 2: 241-262.
98. DNA Advisory Board. Statistical and population genetics issues affecting the evaluation of the frequency of occurrence of DNA profiles calculated from pertinent population database(s), Forensic Science Communications (July 2000) Volume 2, Number 3.
99. Dror, I.E. and Hampikian, G., 2011. Subjectivity and bias in forensic DNA mixture interpretation. Science & Justice, 51(4), pp.204-208.

100. Duenhoelter, J.H., et al. Detection of Seminal Fluid Constituents After Alleged Sexual Assault, Journal of Forensic Sciences (1978) 23:824-329.
101. Edwards, A., Civitello, A., Hammond, H., and Caskey, C.T. DNA typing and genetic mapping with trimeric and tetrameric tandem repeats, American Journal of Human Genetics (1991) 49:746–756.
102. Eichmann, C. and Parson, W., 'Mitominis': multiplex PCR analysis of reduced size amplicons for compound sequence analysis of the entire mtDNA control region in highly degraded samples. International Journal of Legal Medicine (2008) 122(5):385-8.
103. Elston, R.C., Stewart, J. A general model for the genetic analysis of pedigree data, Human Heredity, 21 (1971) 523–542; doi:10.1159/000152448.
104. Evett, I.W. Buffery, C., Willott, G., Stoney, D. (1991) A guide to interpreting single locus profiles of DNA mixtures in forensic cases, J. Forensic Sci. Soc. 31: 41–47.
105. Evett, I.W., Weir, B.S. (1998) Interpreting DNA Evidence. Sinauer: Sunderland, MA.
106. FBI Director (2009) Quality Assurance Standards for Forensic DNA Testing Laboratories. See http://www.fbi.gov/hq/lab/html/codis1.htm.
107. Federal Bureau of Investigation (2011) Quality Assurance Standards for Forensic DNA Testing Laboratories, available at http://www.fbi.gov/about-us/lab/codis/qas-standards-for-forensic-dnatesting-laboratories-effective-9-1-2011
108. Federal Bureau of Investigation, (2015) NDIS Operational Procedures Manual, available at http://www.fbi.gov/about-us/lab/biometric-analysis/codis/ndis-procedures-manual.
109. Findlay, I., Taylor, A., Quirke, P., Frazier, R., and Urquhart, A. (1997) DNA fingerprinting from single cells, Nature 389(6651):555-556.
110. Foreman, L.A., Champod, C., Evett, I.W., Lambert, J.A., and Pope, S., 2003. Interpreting DNA evidence: A review. International Statistical Review, 71, pp.473–495.
111. Fregeau, C.J. and Fourney, R.M. A DNA typing with fluorescently tagged short tandem repeats: A sensitive and accurate approach to human identification, BioTechniques (1993) 15:100–119.
112. Fregeau, C.J., Bowen, K.L., and R.M. Fourney. "Validation of highly polymorphic fluorescent multiplex short tandem repeat systems using two generations of DNA sequencers." *Journal of Forensic Sciences*, Vol. 44, No. 1 (1999): 133-66.
113. Fung, W.K. and Hu, Y.-Q. (2008) Statistical DNA Forensics: Theory, Methods and Computation. Wiley: Hoboken, NJ.
114. Gabriel, M., Huffine, E., Ryan, J., Holland, M., Parsons, T. Improved mtDNA sequence analysis of forensic remains using a "mini-primer set" amplification strategy. Journal of Forensic Science (2001) 46(2): 247-253.
115. Ge, J., Budowle, B., and Chakraborty R. Choosing relatives for DNA identification of missing persons, Journal of Forensic Sciences (2011) 56:S23-S28.
116. Ge, J., Budowle, B., Planz, J.V., Eisenberg, A.J., Ballantyne, J., and Chakraborty R. US forensic Y-chromosome short tandem repeats database, Legal Medicine (2010a) 12:289-295.
117. Ge, J., Chakraborty, R., and Budowle, B. Test of independence in contingency tables of large dimension with ordered categories and its application in population genetics, Abstract Volume of the American Society of Human Genetics 60th Annual Meeting, Washington DC (November 2-6, 2010b; Abstract # 3045/F).
118. Gill P., Buckleton, J., Commentary on: Budowle, B., Onorato, A.J., Callaghan, T.F., Manna, A.D., Gross, A.M., Guerrieri, R.A., Luttman, J.C., McClure, D.L. Mixture Interpretation: Defining the relevant features for guidelines for the assessment of mixed DNA profiles in forensic casework. Journal of Forensic Sciences, 2010, 55(1):265-276.
119. Gill, P. (2001) Application of low copy number DNA profiling, Croatian Medical Journal 42(3):229-232.
120. Gill, P. (2002) Role of short tandem repeat DNA in forensic casework in the UK--past, present, and future perspectives. BioTechniques 32(2): 366-385.

121. Gill, P. and Buckleton, J. (2009) A universal strategy to interpret DNA profiles that does not require a definition of low-copy-number. Forensic Sci. Int. Genet.
122. Gill, P. et al. (2012) DNA Commission of the International Society of Forensic Genetics: Recommendations on the evaluation of STR typing results that may include drop-out and/or drop-in using probabilistic methods, Forensic Science International Genetics 6(6): 679-688.
123. Gill, P., Brenner, C., Brinkmann, B., Budowle, B., Carracedo, Á, Jobling, M.A., de Knijff, P., Kayser, M., Krawczak, M., Mayr, W.R., et al. (2001). DNA Commission of the International Society of Forensic Genetics: recommendations on forensic analysis using Y-chromosome STRs, Forensic Science International 124, 5–10.
124. Gill, P., Brenner, C.H., Buckleton, J.S., Carracedo, A., Krawczak, M., Mayr, W.R., Morling, N., Prinz, M., Schneider, P.M., Weir, B.S. (2006) DNA commission of the International Society of Forensic Genetics: Recommendations on the interpretation of mixtures. Forensic Sci. Int. 160: 90-101.
125. Gill, P., Brown, R.M., Fairley, M., Lee, L., Smyth, M., Simpson, N., Irwin, B., Dunlop, J., Greenhalgh, M., Way, K., Westacott, E.J., Ferguson, S.J., Ford, L.V., Clayton, T., Guiness, J. (2008) National recommendations of the technical UK DNA working group on mixture interpretation for the NDNAD and for court going purposes. FSI Genetics 2(1): 76–82.
126. Gill, P., Ivanov, P.L., Kimpton, C., Piercy, R., Benson, N., Tully, G., Evett, I., Hagelberg, E., and Sullivan, K. Identification of the remains of the Romanov family by DNA analysis, Nature Genetics (1994) 6(2):130–135.
127. Gill, P., Jeffreys, A.J., and Werrett, D.J. Forensic application of DNA 'fingerprints', Nature (1985) 318:577-579.
128. Gill, P., Jeffreys, A.J., and Werrett, D.J. Individual-specific 'fingerprints' of human DNA, Nature (1985) 316:76–79.
129. Gill, P., Puch-Solis, R., Curran, J. (2009) The low-template DNA (stochastic) threshold-its determination relative to risk analysis for national DNA databases. Forensic Sci. Int. Genet. 3: 104-111.
130. Gill, P., Sparkes, R., Kimpton, C. (1997) Development of guidelines to designate alleles using an STR multiplex system. Forensic Sci. Int. 89: 185-197.
131. Gill, P., Whitaker, J., Flaxman, C., Brown, N., and Buckleton, J. (2000) An investigation of the rigor of interpretation rules for STRs derived from less than 100 pg of DNA, Forensic Science International 112(1):17-40.
132. Gill. P., Brenner, C., Brinkmann, B., Budowle, B., Carracedo, A., Jobling, M.A., De, K., Kayser, M., Krawczak, M., Mayr, W.R., Morling, N., Olaisen, B., Pascali, V., Prinz, M., Roewer, L., Schneider, P.M., Sajantila, A., Tyler-smith, C. DNA Commission of the International Society of Forensic Genetics (ISFG): recommendations on forensic analysis using Y-chromosome STRs, Forensic Science International (2001) 124:5-10.
133. Giusti, A.M., Baird, M., Pasquale, S., Balasz, I., and Glassberg, G. Application of deoxyribonucleic acid (DNA) polymorphisms to the analysis of DNA recovered from sperm, Journal of Forensic Sciences (1986) 31:409–417.
134. Gjertson, D.W., Brenner, C.H., Baur, M.P., Carracedo, A., Guidet, F., Lugue, J.A., Lessig, R., Mayr, W.R., Pascali, V.L., Prinz, M., Schneider, P.M., Morling, N. ISFG: Recommendations on biostatistics in paternity testing. Forensic Science International: Genetics (2007) 1(3-4):223-31.
135. Graham, E.A.M. and Rutty, G.N. (2008) Investigation into "normal" background DNA on adult necks: implications for DNA profiling of manual strangulation victims. J. Forensic Sci. 53: 1074-1082.
136. Graves, H.C.B., Sensabaugh, G.F. and Blake, E.T. Postcoital detection of a male-specific semen protein, New England Journal of Medicine (1985) 312:338-343.
137. Greenspoon SA, Schiermeier-Wood L, Jenkins BC. Establishing the limits of TrueAllele® Casework: A validation study. *J Forensic Sci*. 2015; 1263–76.

138. Grispino. R. The Effects of Luminol on the Serological Analysis of Dried Human Bloodstains, Crime Laboratory Digest (1990) 17(1):13-23.
139. Gusmão, L., Brion, M., González-Neira, A., Lareu, M., Carracedo, A. Y chromosome specific polymorphisms in forensic analysis, Legal Medicine (1999) 1:55-60.
140. Gusmão, L., Butler, J.M., Carracedo, A., Gill, P., Kayser, M., Mayr, W.R., Morling, N., Prinz, M., Roewer, L., Tyler-Smith, C., Schneider, P.M. DNA Commission of the International Society of Forensic Genetics (ISFG): an update of the recommendations on the use of Y-STRs in forensic analysis. International Journal of Legal Medicine, 2006, 120:191-200.
141. Gusmão, L., Butler, J.M., Carracedo, Á., Gill, P., Kayser, M., Mayr, W.R., Morling, N., Prinz, M., Roewer, L., Tyler-Smith, C., et al. (2006). DNA Commission of the International Society of Forensic Genetics (ISFG): An update of the recommendations on the use of Y-STRs in forensic analysis, Forensic Science International 157, 187–197.
142. Hammond, H.A., Jin, L., Zhong, Y., Caskey, C.T., and Chakraborty, R. Evaluation of 13 short tandem repeat loci for use in personal identification applications, American Journal of Human Genetics (1994) 55:175–189.
143. Hatch, A.L. A Modified Reagent for the Confirmation of Blood, Journal of Forensic Sciences (1993) 38(6):1502-1506.
144. Heller, C. Principles of DNA separation with capillary electrophoresis, Electrophoresis, (2001) 22:629-643.
145. Hochmeister, M.N., Budowle, B., Rudin, O., Gehrig, C., Borer, U., Thali, M., and Dirnhofer R. Evaluation of prostate-specific antigen (PSA) membrane test assay for the forensic identification of seminal fluid. Journal of Forensic Sciences (1999) 44:1057-1060.
146. Hofgartner, W.T., and J.F. Tait. "Frequency of problems during clinical molecular-genetic testing." *American Journal of Clinical Pathology,* Vol. 112 (1999): 14-21.
147. Holland, M.M., Parsons, T.J. Mitochondrial DNA sequence analysis. Validation and use for forensic casework, Forensic Science Review (1999) 11:21-50. Published comments by Budowle et al. and authors_ reply appear in Forensic Science Review (1999) 11(2):175.
148. Hopgood, R., Sullivan, K.M., Gill, P. Strategies for automated sequencing of human mitochondrial DNA directly from PCR products, BioTechniques (1992) 13:82-92
149. Hutchinson, C.A., Newbold, J.E., Potter, S.S., Edgell, M.H. Maternal inheritance of mammalian mitochondrial DNA, Nature (1974) 251:536-538.
150. Isaacson, J., Schwoebel, E., Shcherbina, A., Ricke, D., Harper, J., Petrovick, M., Bobrow, J., Boettcher, T., Helfer, B., Zook, C. and Wack, E., 2015. Robust detection of individual forensic profiles in DNA mixtures. Forensic Science International: Genetics, 14, pp.31-37.
151. Issaq, HJ, Chan, K.C., Muschik. G.M. The effect of column length, applied voltage, gel type and concentration on the capillary Electrophoresis separation of DNA fragments and polymerase chain reaction products, Electrophoresis (1997) 18:1153-1158.
152. Ivanov, P.L., Wadhams, M.J., Roby, R.K., Holland, M.M., Weedn, V.W., Parsons, T.J. Mitochondrial DNA sequence heteroplasmy in the Grand Duke of Russia Georij Romanov establishes the authenticity of the remains of Tsar Nicholas II, Nature Genetics (1996) 12:417-420.
153. J.A. Bright, D. Taylor, J. M. Curran, J. S. Buckleton, Developing allelic and stutter peak height models for a continuous method of DNA interpretation, Forensic Science International: Genetics. 7(2) (2013) 296-304.
154. J.M. Butler "DNA Error Rates" presentation at the International Forensics Symposium, Washington, D.C. (2015).
155. Jeffreys, A., Wilson, V., Thein, S. Hypervariable 'minisatellite' regions in human DNA. Nature (1985) 314 (6006):67-73.

156. Jeffreys, A.J., Brookfield, J.F., and Semeonoff, R. Positive identification of an immigration test case using human DNA fingerprints, Nature (1985) 317:818–819.
157. Jeffreys, A.J., Wilson, V., and Thein, S.L. Individual-specific 'fingerprints' of human DNA, Nature (1985) 318:577–579.
158. Jobling, M.A., Tyler-Smith, C. The Human Y chromosome: An evolutionary marker comes of age, Nature Reviews. Genetics (2003) 4:598-612.
159. Kader, F., Ghai, M., 2015. DNA methylation and application in forensic sciences. Forensic Science International, 249, pp.255-265.
160. Kaye, D.H. "DNA Evidence: Probability, Population Genetics, and the Courts." *Harv. J. L. & Tech*, Vol 7 (1993)101-72.
161. Kayser, M., Brauer, S., Willuweit, S., Schadlich, H., Batzer, M.A., Zawacki, J., Prinz, M., Roewer, L. and Stoneking, M. Online Y-chromosomal short tandem repeat haplotype reference database (YHRD) for U.S. populations, Journal of Forensic Sciences (2002) 47:513-519.
162. Kayser, M., Caglia, A., Corach, D., and Fretwell, N. Evaluation of Y-chromosomal STRs: A multicenter study, International Journal of Legal Medicine (1997) 110:125–133, 141–149.
163. Kelly. H. et al. (2014) A comparison of statistical models for the analysis of complex forensic DNA profiles, Science &Justice 54(1): 66-70.
164. Kimpton, C.P., Oldroyd, N.J., Watson, S.K., Frazier, R.R., Johnson, P.E., Millican, E.S., Urguhart, A., Sparkes, B.L., and P. Gill. "Validation of highly discriminating multiplex short tandem repeat amplification systems for individual identification." *Electrophoresis*, Vol. 17, No. 8 (1996): 1283-93.
165. Kind, S.S. The Acid Phosphatase Test, Methods of Forensic Science (1964) 3:267-287.
166. Kipps, A.E., and Whitehead, P.H. The significance of amylase in forensic investigations of body fluids, Forensic Science (1975) 6:136-144.
167. Kita, T., Yamaguchi, H., Yokoyama, M., Tanaka, T., and Tanaka, N. (2008) Morphological study of fragmented DNA on touched objects, Forensic Science International: Genetics 3(1):32-36.
168. Kloosterman, A., Sjerps, M., and A. Quak. "Error rates in forensic DNA analysis: Definition, numbers, impact and communication." *Forensic Science International: Genetics*, Vol. 12 (2014): 77-85.
169. Kloosterman, A.D. and Kersbergen, P. (2003) Efficacy and limits of genotyping low copy number (LCN) DNA samples by multiplex PCR of STR loci. Journal de la Société de biologie 197(4):351-359.
170. Knijff, P., and Kayser, M. (2012). A new future of forensic Y-chromosome analysis: Rapidly mutating Y-STRs for differentiating male relatives and paternal lineages, Forensic Science International: Genetics 6, 208–218.
171. Krane, D.E., Ford, F., Gilder, J.R., Inman, K., Jamieson, A., Koppl, R., Kornfield, I.L., Risinger, D.M., Rudin, N., Taylor, M.C., Thompson W.C., Sequential Unmasking: A Means of Minimizing Observer Effects in Forensic DNA Interpretation, J Forensic Sci 53(4), 2008.
172. Krane, D.E., Ford, F., Gilder, J.R., Inman, K., Jamieson, A., Koppl, R., Kornfield, I.L., Risinger, D.M., Rudin, N., Taylor, M.C., Thompson W.C., Authors' Response, J Forensic Sci, 54(2) 2009.
173. Krimsky, S., and T. Simoncelli. *Genetic Justice: DNA Data Banks, Criminal Investigations, and Civil Liberties.* Columbia University Press, (2011).
174. Krupp, M.A., et al. Physician's handbook, Lange Medical Publications (1970).
175. Kuriyama, M., Wang, M.C., Papsidero, L.D., Killian, C.S., Shimano, T., Valenzuela, L., Nishiura, T., Murphy, G.P. and Chu, T. M. Quantitation of prostate-specific antigen in serum by a sensitive enzyme immunoassay, Cancer Research (1980) 40:4568-4662.
176. Ladd, C., Lee, H.C., Yang, N., Bieber, F.R. (2001) Interpretation of complex forensic DNA mixtures. Croatian Med. J. 42(3): 244-246.
177. Lander, E.S. "DNA fingerprinting on trial." *Nature,* Vol. 339 (1989): 501-5.
178. Lander, E.S. and Budowle, B. DNA fingerprinting dispute laid to rest, Nature (1994) 371:735–738.

179. Lazaruk, K., Walsh, P., Oaks, F., Gilbert, D., Rosenblum, B., Menchen, S., Scheibler, D., Wenz, H., Holt, C., and Wallin, J. Genotyping of forensic short tandem repeat (STR) systems based on sizing precision in a capillary electrophoresis instrument, Electrophoresis (1998) 19:86–93.
180. Lee, H. C. Identification and grouping of bloodstains, Forensic Science Handbook, Prentice-Hall (1982) 267-337.
181. Lewontin, R.C., Hartl, D.L. Population genetics in forensic DNA typing, Science (1991) 254:1745–1750.
182. Lloyd, J.B.F., Weston, N.T. A spectrometric study of the fluorescence detection of fecal urobilinoids, Journal of Forensic Sciences (1982) 27(2).
183. Lygo, J.E., Johnson, P.E., Holdaway, D.J., Woodroffe, S., Whitaker, J.P., Clayton, T.M., Kimpton, C.P., and P. Gill. "The validation of short tandem repeat (STR) loci for use in forensic casework." *International Journal of Legal Medicine,* Vol. 107, No. 2 (1994): 77-89.
184. Mannucci, A., Sullivan, K.M., Ivanov, P.L., and Gill, P. Forensic application of a rapid and quantitative DNA sex test by amplification of the X-Y homologous gene amelogenin, International Journal of Legal Medicine (1994) 106:190–193.
185. Mansfield, E.S., Robertson, J.M., Vainer, M., Isenberg, A.R., Frazier, R.R., Ferguson, K., Chow, S., Harris, D.W., Barker, D.L., Gill, P.D., Budowle, B., and McCord, B.R. Analysis of multiplexed short tandem repeat (STR) systems using capillary array electrophoresis, Electrophoresis (1998) 19(1):101–107.
186. McCabe, J. "DNA fingerprinting: The failings of Frye," *Norther Illinois University Law Review*, Vol. 16 (1996): 455-82.
187. Melton, T. Mitochondrial DNA heteroplasmy, Forensic Science Review (2004) 16:2-19
188. Melton, T., Clifford, S., Kayser, M., Nasidze, I., Batzer, M., Stoneking, M. Diversity and heterogenetity in mitochondrial DNA of North American populations, Journal of Forensic Sciences (2001) 46(1)1:46-52.
189. Metropolitan Police Forensic Science Laboratory, Biology Methods Manual. (1978) 4-1 through 4-9.
190. Miller, K.W.P. and Budowle, B. A compendium of human mitochondrial DNA control region sequences: Development of an international standard forensic database. Croatian Medical Journal (2001) 42:315-327.
191. Mitchell, A.A., Tamariz, J., O'Connell, K., Ducasse, N., Budimlija, Z., Prinz, M., and Caragine, T. (2012) Validation of a DNA mixture statistics tool incorporating allelic drop-out and drop-in, Forensic Science International: Genetics 6(6):749-761.
192. Mohammed A.K., et al. Frequencies of 15 autosomal STR loci in Arabs Iraqi population samples. (Publication information unknown).
193. Monson, K.L., Miller, K.W.P., Wilson, M.R., DiZinno, J.A., and Budowle, B. The mtDNA population database: An integrated software and database resource, Forensic Science Communications (April 2002) Volume 4, Number 2.
194. Moretti, T.R., Baumstark, A.L., Defenbaugh, D.A., Keys, K.M., Budowle, B. (2001) Validation of short tandem repeats (STRs) for forensic usage: performance testing of fluorescent multiplex STR systems and analysis of authentic and simulated forensic samples. J. Forensic Sci. 46: 647-660.
195. Moretti, T.R., Baumstark, A.L., Defenbaugh, D.A., Keys, K.M., Budowle, B. (2001) Validation of STR typing by capillary electrophoresis. J. Forensic Sci. 46: 661-676.
196. Morling N., Bastisch, I., Gill, P., Schneider, P.M. (2007) Interpretation of DNA mixtures – European consensus on principles. Forensic Sci. Int. Genet. 1(3): 291–292.
197. Mulero, J.J., Chang, C.W., Calandro, L.M., Green, R.L., Li, Y, Johnson, C.L. and Hennessy, L.K. Development and validation of the AmpFlSTR YFiler PCR amplification kit: a male specific, single amplification 17 Y-STR multiplex system, Journal of Forensic Sciences (2006) 51:64-75.
198. Natelson, S., Microtechniques of Clinical Chemistry, Charles C. Thomas Publishers, Springfield, IL (1957).

199. National Research Council. *The Evaluation of Forensic DNA Evidence.* The National Academies Press. Washington DC. (1996). Goode, M. “Some observations on evidence of DNA frequency.” *Adelaide Law Review,* Vol. 23 (2002): 45-77.
200. Nelson, D.F., and Kirk, P.L. The Identification of Saliva, Journal of Forensic Medicine (1963) 10:14-21.
201. Omar, A.J., Mahmood, H.K., Husein, E.A. and Salman, N.F., 2012. DNA paternity test and statistics for father-daughter incest case. Iraqi J. Biotech. 11(2), pp.407- 413.
202. Ostrum B. Commentary on: Sequential unmasking: a means of minimizing observer effects in forensic DNA interpretation. J Forensic Sci, 54(6), 2009.
203. Pääbo, S. Mutational hot spots in the mitochondrial microcosm, American Journal of Human Genetics (1996) 59:493-496.
204. Parker, L.S., London, A.J., Aronson, J.D. Incidental findings in the use of DNA to identify human remains: An ethical assessment, Forensic Science International Genetics, 7 (2013), 221-229; doi: 10.1016/j.fsigen.2012.10.002.
205. Parson, W. and Dur, A. EMPOP- a forensic mtDNA database. Forensic Sci Int Genet (2007) 1(2):88-92.
206. Parsons, T.J., Muniec, D.S., Sullivan, K., Woodyatt, N., Alliston-Greiner, R., Wilson, M.R., Berry, D.L., Holland, K.A., Weedn, V.W., Gill, P., Holland, M.M. A high observed substitution rate in the human mitochondrial DNA control region, Nature Genetics (1997) 15:363-368.
207. Perlin, M. W. and Szabady, B. (2001) Linear mixture analysis: a mathematical approach to resolving mixed DNA samples. J. Forensic Sci. 46(6): 1372-1378.
208. Perlin, M.W., Belrose, J.L., and Duceman, B.W. New York State TrueAllele® Casework validation study. Journal of Forensic Sciences, 58(6):1458-1466, 2013.
209. Perlin, M.W., Dormer, K., Hornyak, J., Schiermeier-Wood, L., and Greenspoon, S. TrueAllele Casework on Virginia DNA mixture evidence: computer and manual interpretation in 72 reported criminal cases. PLoS ONE, 9(3):e92837, 2014.
210. Perlin, M.W., Hornyak, J.M., Sugimoto, G., and Miller, K.W.P. TrueAllele genotype identification on DNA mixtures containing up to five unknown contributors. Journal of Forensic Sciences, 60(4):857-868, 2015.
211. Perlin, M.W., Kadane, J.B., Cotton, R.W. (2009) Match likelihood ratio for uncertain genotypes. Law, Probability and Risk 8(3):289-302.
212. Polanskey, D., Den Hartog, B.K., Elling, J.W., Fisher, C.L., Kepler, R.B., Budowle, B. Comparison of Mitotyper Rules and Phylogenetic-based mtDNA Nomenclature Systems. Journal of Forensic Science (2010) 55(5):1184-1189.
213. Prinz M., Advantages and disadvantages of Y-short tandem repeat testing in forensic casework, Forensic Science Review (2003) 15:191.
214. Prinz, M., Boll, K., Baum, H., Shaler, B. Multiplexing of Y chromosome specific STRs and performance for mixed samples, Forensic Science International (1997) 85(3):209-18.
215. Prinz, M., Carracedo, A., Mayr, W.R., Morling, N., Parsons, T.J., Sajantila, A., Scheithauer, R., Schmitter, H., Schneider, P.M. DNA Commission of the International Society for Forensic Genetics (ISFG): Recommendations regarding the role of forensic genetics for disaster victim identification (DVI), Forensic Science International Genetics, 1(1), (2007) 3-12; doi: 10.1016/j.fsigen.2006.10.003.
216. Reynolds, R., Sensabaugh, G., and Blake, E. Analysis of genetic markers in forensic DNA samples using the polymerase chain reaction, Analytical Chemistry (1991) 63(1):2–15.
217. Ricke, D., Shcherbina, A., Chiu, N., Schwoebel, E., Harper, J., Petrovick, M., Boettcher, T., Zook, C., Bobrow, J. and Wack, E., 2015. Sherlock's Toolkit: A forensic DNA analysis system. Technologies for Homeland Security (HST), 2015 IEEE International Symposium, pp.1-10.
218. Risch, N.J. and Devlin, B. On the probability of matching DNA fingerprints, Science (1992) 255:717–720.
219. Roberts, L. “Fight erupts over DNA fingerprinting.” *Science*, Vol. 254 (1991): 1721-3.

220. Roby, R.K., Gonzalez, S.D., Phillips, N.R., Planz, J.V., Thomas, J.L., Pantoza-Astudillo, J.A., Ge, J., Morales, E.A., Eisenberg, A.J., Chakraborty, R., Bustos, P., and Budowle, B. Autosomal STR allele frequencies and Y-STR and mtDNA haplotypes in Chilean sample populations, Forensic Science International: Genetics, Supplemental Series (2009) 2:533-534.
221. Röck, A., Irwin, J., Dür, A., Parsons, T., Parson, W. SAM: String-based sequence search algorithm for mitochondrial DNA database queries. Forensic Science International: Genetics (2011) 5(2):126-132.
222. Roeder, K. DNA fingerprinting: A review of the controversy, Statistical Sciences (1994) 9:222–278.
223. Ruitberg C.M., Reeder D.J., Butler J.M. STRBase: a short tandem repeat DNA database for the human identity testing community, Nucleic Acids Research (2001) 29 (1):320-322.
224. Saiki, R.K., Gelfand, D.H., Stoffel, S., Scharf, S.J., Higuchi, R., Horn, G.T., Mullis, K.B., and Erlich, H.A. Primer-directed enzymatic amplification of DNA with a thermostable DNA polymerase, Science (1988) 239:487–491.
225. Saiki, RK., Scharf, S., Faloona, F., Mullis, K.B., Horn, G.T., Erlich, H.A., Arnheim, N. Enzymatic amplification of beta-globin genomic sequences and restriction site analysis for diagnosis of sickle cell anemia. Science, 1985, 230: 1350-1354.
226. Sanger, F. and Coulson, A. R. A rapid method for determining sequences in DNA by primed synthesis with DNA polymerase. J Mol Biol (1975) 94(3):441-8.
227. Sanger, F., Nicklen, S., Coulson, A.R. DNA sequencing with chain-terminating inhibitors, Proceedings of the National Academy of Sciences USA (1977) 74:5463-5467.
228. Schill, W.B. and Schumacher, G.F.B. Radial diffusion in gel for microdetermination of enzymes, Anal. Biochem (1972) 46:502-503.
229. Schneider, P.M., Fimmers, R., Keil, W., Molsberger, G., Patzelt, D., Pflug, W., Rothämel, T., Schmitter, H., Schneider, H., Brinkman, B. (2009) The German Stain Commission: recommendations for the interpretation of mixed stains. Int. J. Legal Med. 123: 1-5; originally published in German in 2006 Rechtsmedizin 16:401-404.
230. Schneider, P.M., Gill, P., Carracedo, A. (2006) Editorial on the recommendations of the DNA commission of the ISFG on the interpretation of mixtures. Forensic Sci. Int. 160: 89.
231. Scientific Working Group on DNA Analysis Methods (2010) Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories, available at http://www.swgdam.org/Interpretation_Guidelines_January_2010.pdf
232. Scientific Working Group on DNA Analysis Methods (2012) Validation Guidelines for DNA Analysis Methods, available at http://www.swgdam.org/SWGDAM_Validation_Guidelines_APPROVED_Dec_2012.pdf
233. Scientific Working Group on DNA Analysis Methods (SWGDAM). Guidelines for Mitochondrial DNA (mtDNA) Nucleotide Sequence Interpretation. Forensic Science Communications (2003) [Online]. Available: http://www.fbi.gov/about-us/lab/forensic-sciencecommunications/fsc/april2003/swgdammitodna.htm/
234. Scientific Working Group on DNA Analysis Methods (SWGDAM). Revised Validation Guidelines, Forensic Science Communications (2004) [Online]. Available: http://www.fbi.gov/about-us/lab/forensic-sciencecommunications/fsc/july2004/standards/2004_03_standards02.htm/
235. Scientific Working Group on DNA Analysis Methods (SWGDAM). Short Tandem Repeat (STR) Interpretation Guidelines, Forensic Science Communications 2 (July 2000). See http://www.fbi.gov/hq/lab/fsc/backissu/july2000/strig.htm
236. Scientific Working Group on DNA Analysis Methods. Guidelines for mitochondrial DNA (mtDNA) nucleotide sequence interpretation, Forensic Science Communications (April 2003) Vole news 5, Number 2.
237. Scientific Working Group on DNA Analysis Methods. Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories. Approved at the Scientific Working Group on DNA

Analysis Methods meeting, Fredericksburg, Virginia, January 2010. Available at http://www.swgdam.org/Interpretation_Guidelines_January_2010.pdf
238. Scientific Working Group on DNA Analysis Methods. YSTR interpretation guidelines, Forensic Science Communications (January 2009) Volume 11, Number 1.
239. Sensabaugh, G. F. Isolation and characterization of a semen-specific protein from human seminal plasma: a potential new marker for semen identification, Journal of Forensic Sciences (1978) 23:105-115.
240. Smith, P.J. and Ballantyne, J. (2007) Simplified low-copy-number DNA analysis by post-PCR purification, Journal of Forensic Sciences 52(4):820-829.
241. Steele, C. D. and Balding, D. J. (2014) Statistical Evaluation of Forensic DNA Profile Evidence, Annu. Rev. Stat. Appl. 1:361-384.
242. Steussy, E.E., Eisen, J., Imwinkelried, E.J. and Vandamme, A.M., 2015. Microbial Forensics: The Biggest Thing Since DNA?. UC Davis Legal Studies Research Paper, p. 416.
243. Stewart, J.E.B., Fisher, C.L., Aagaard, P.J., Wilson, M.R., Isenberg, A.R., Polanskey, D., Pokorak, E., DiZinno, J.A., Budowle, B. Length variation in HV2 of the human mitochondrial DNA control region, Journal of Forensic Sciences (2001) 46:862-870.
244. Stoneking, M. Hypervariable sites in the mtDNA control region are mutational hotspots, American Journal of Human Genetics (2000) 67:1029-1032.
245. Stowell, L.I., Sharman, L.E. and Hamel, K. An enzyme-linked immunosorbent assay (ELISA) for prostate-specific antigen, Forensic Science International (1991) 50:125-138.
246. Stringer, P., Scheffer, J.W., Scott, P., Lee, J., Goetz, R., Ientile, V., Eckhoff, C., Turbett, G., Carroll, D., Harbison, S. (2009) Interpretation of DNA mixtures—Australian and New Zealand consensus on principles. Forensic Sci. Int. Genet. 3: 144-145.
247. Sturk, K.A., Coble, M.D., Barritt, S.M., and Irwin, J.A. (2009) Evaluation of modified Yfiler amplification strategy for compromised samples, Croatian Medical Journal 50(3):228-238.
248. Tamariz, J., Voynarovska, K., Prinz, M., Caragine, T. (2006) The application of ultraviolet irradiation to exogenous sources of DNA in plasticware and water for the amplification of low copy number DNA, Journal of Forensic Sciences 51(4):790-794.
249. Taylor, D. “Using continuous DNA interpretation methods to revisit likelihood ratio behavior.” *Forensic Science International: Genetics,* Vol. 11 (2014)
250. Taylo, D., and J.S. Buckleton. “Do low template DNA profiles have useful quantitative data?” Forensic Science International: genetics. Vol 16 (2015: 13-16.
251. Taylor D., Buckleton J, and Evett I. “Testing likelihood ratios produced from complex DNA profiles.” *Forensic Science International: Genetics.* Vol. 16 (2015): 165-171
252. Taylor, D., Bright, J.A., and Buckleton, J. (2013) The interpretation of single source and mixed DNA profiles, Forensic Science International: Genetics 7(5):516-528.
253. Thompson WC. A sociological perspective on the science of forensic DNA testing. UC Davis Law Rev, 30(4), 1997.
254. Thompson, W.C. “Painting the target around the matching profile: the Texas sharpshooter fallacy in forensic DNA interpretation.” *Law, Probability and Risk*, Vol. 8, No. 3 (2009): 257-76.
255. Thompson, W.C. and Ford, S. “Is DNA fingerprinting ready for the courts?” *New Scientist,* Vol. 125 (1990).
256. Thompson, W.C. and Ford, S., The meaning of a match: Sources of ambiguity in the interpretation of DNA prints. In J. Farley & J. Harrington (Eds.) Forensic DNA Technology. New York: CRC Press, Inc., 1991.
257. Thompson, W.C., Accepting Lower Standards: The National Research Council’s Second Report on Forensic DNA Evidence. Jurimetrics 37(4), 1997.

258. Thompson, W.C., F. Taroni, and C.G.G. Aitken. "How the Probability of a False Positive Affects the Value of DNA Evidence." *J Forensic Sci,* Vol. 48, No. 1 (2003): 1-8.
259. Thompson, W.C., Subjective interpretation, laboratory error and the value of DNA evidence: Three case studies. Genetica 96, 1995.
260. Tomsey, C.S., Kurtz, M., Flowers, B., Fumea, J., Giles, B., Kucherer, S. (2001) Case work guidelines and interpretation of short tandem repeat complex mixture analysis. Croatian Med. J. 42(3): 276-280.
261. Torres, Y., Flores, I., Prieto, V., Lopez-Soto, M., Farfan, M.J., Carracedo, A., Sanz, P. (2003) DNA mixtures in forensic casework: a 4-year retrospective study. Forensic Sci. Int. 134: 180-186.
262. Tully, G., Bär, W., Brinkmann, B., Carracedo, A., Gill, P., Morling, N., Parson, W., Schneider, P. Considerations by the European DNA profiling (EDNAP) group on the working practices, nomenclature and interpretation of mitochondrial DNA profiles, Forensic Science International (2001) 124:83-91.
263. Tvedebrink, T., Eriksen, P.S., Mogensen, H.S., Morling, N. (2009) Estimating the probability of allelic drop-out of STR alleles in forensic genetics. FSI Genetics 3: 222-226.
264. U.S Department of Justice, Office of Justice Programs, National Institute of Justice. *Convicted by Juries, Exonerated by Science: Case Studies in the Use of DNA Evidence to Establish Innocence after Trial,* (1996).
265. Van Nieuwerburgh, F., Goetghebeur, E., Vandewoestyne, M., Deforce, D. (2009) Impact of allelic dropout on evidential value of forensic DNA profiles using RMNE. Bioinformatics 25: 225-229.
266. van Oorschot, R.A., Treadwell, S., Beaurepaire, J., Holding, N.L., and Mitchell, R.J. (2005) Beware of the possibility of fingerprinting techniques transferring DNA, Journal of Forensic Sciences 50(6):1417-1422.
267. Wakeley, J. Substitution rate variation among sites in hypervariable region 1 of human mitochondrial DNA, Journal of Molecular Evolution, (1993) 37:613-623.
268. Walker, T.J. Chimaerism, mosaicism, and forensic DNA analysis, Canadian Society of Forensic Science Journal (2008) 41(1):21-28.
269. Walsh, B., Redd, A.J., and Hammer, M.F. Joint match probabilities for Y chromosomal and autosomal markers, Forensic Science International (2008) 174:234-238.
270. Walsh, P.S., Fildes, N.J., and Reynolds, R. Sequence analysis and characterization of stutter products at the tetranucleotide repeat locus vWA, Nucleic Acids Research (1996) 24:2807–2812.
271. Wang, M.C., Valenzuela, L.A., Murphy, G.P., and Chu, T.M. Purification of a human prostate specific antigen, Investigative Urology (1979) 16:159-163.
272. Wang, T., Xue, N., Birdwell, J.D. (2006) Least-squares deconvolution: a framework for interpreting short tandem repeat mixtures. J. Forensic Sci. 51(6): 1284-1297.
273. Watson, J.D., Crick F.H.C. A structure for deoxyribose nucleic acid, Nature (April 25) 1953:737-738.
274. Weir, B.S. and Cockerahm, C.C. Estimating F-statistics for the analysis of population structure, Evolution (1984) 38:1358-1370.
275. Weir, B.S., Ballantyne, J., Bright, J.-A., Buckleton, J., Curran, J., Laurie, C., Moretti, T., and Myers, S. Y-STR matching: A population-genetic perspective, 25th World Congress of the International Society for Forensic Genetics (2013). http://isfg2013.org/wpcontent/uploads/2013/09/Thu-P3-1230-B-Weir-Y.pdf
276. Weir, B.S., Triggs, C.M., Starling, L., Stowell, L.I., Walsh, K.A.J., Buckleton, J.S. (1997) Interpreting DNA mixtures. J. Forensic Sci. 42(2): 213-222.
277. Wells J.D. Commentary on: Sequential unmasking: a means of minimizing observer effects in forensic DNA interpretation. J Forensic Sci, 54(2) 2009.
278. Westen, A.A., Nagel, J.H., Benschop, C.C., Weiler, N.E., de Jong, B.J., and Sijen, T. (2009) Higher capillary electrophoresis injection settings as an efficient approach to increase the sensitivity of STR typing, Journal of Forensic Sciences 54(3):591-598.

279. Whitaker, J.P., Cotton, E.A., and Gill, P. (2001) A comparison of the characteristics of profiles produced with the AmpFℓSTR SGM Plus multiplex system for both standard and low copy number (LCN) STR DNA analysis. Forensic Science International 123(2-3):215-223.
280. Wickenheiser, R.A. (2002) Trace DNA: a review, discussion of theory, and application of the transfer of trace quantities of DNA through skin contact, Journal of Forensic Sciences 47(3):442-450.
281. Wickenheiser, R.A. (2006) General guidelines for categorization and interpretation of mixed STR DNA profiles. Canadian Society of Forensic Science Journal 39(4): 179-216.
282. Wiegand, P. and Kleiber, M. (1997) DNA typing of epithelial cells after strangulation, International Journal of Legal Medicine 110(4):181-183.
283. Wilcott, G.M. An Improved Test for the Detection of Salivary Amylase in Stains, Journal of Forensic Science Society (1974) 14:341-344.
284. Wilson, M.R., Allard, M.W., Monson, K., Miller, K.W.P., and Budowle, B. Recommendations for consistent treatment of length variants in the human mitochondrial DNA control region. Forensic Science International (2002) 129:35-42.
285. Wilson, M.R., Allard, M.W., Monson, K., Miller, K.W.P., and Budowle, B. Further discussion of the consistent treatment of length variants in the human mitochondrial DNA control region, Forensic Science Communications (2002) [Online]. Available: www.fbi.gov/aboutus/lab/forensic-science-communications/fsc/oct2002/wilson.htm.
286. Wilson, M.R., DiZinno, J.A., Polanskey, D., Replogle, J., and Budowle, B. Validation of mitochondrial DNA sequencing for forensic casework analysis, International Journal of Legal Medicine (1995) 108(2):68–74.
287. Wilson, M.R., Polanskey, D., Butler, J., DiZinno, J.A., Replogle, J., and Budowle, B. Extraction, PCR amplification, and sequencing of mitochondrial DNA from human hair shafts, Biotechniques (1995) 18:662-669.
288. Wilson, M.R., Polanskey, D., Replogle, J., DiZinno, J.A., Budowle, B. A family exhibiting heteroplasmy in the human mitochondrial DNA control region reveals both somatic mosaicism and pronounced segregation of mitotypes, Human Genetics (1997) 100:167-171.
289. Wolf, A., Caliebe, A., Junge, O., Krawczak, M. Forensic interpretation of Ychromosomal DNA mixtures, Forensic Science International (2005) 152:209-213.
290. Wright, P. Enzyme immunoassay observations on aspects of quality control, Veterinary Immunology and Immunopathology (1987) 17:441-452.
291. Wyman, A.R. and White, R. A highly polymorphic locus in human DNA, Proceedings of the National Academy of Sciences (1980) 77:6754–6758.
292. Yi, S.H., Jia, Y.S., Mei, K., Yang, R.Z., Huang, D.X., 2015. Age-related DNA methylation changes for forensic age-predication. International Journal of Legal Medicine, 129(2), pp.237-244.
293. Yi, S.H., Xu, L.C., Mei, K., Yang, R.Z., Huang, D.X., 2014. Isolation and identification of age-related DNA methylation markers for forensic age-prediction. Forensic Science International: Genetics, 11, pp.117-125.
294. Yokota, M., Mitani, T., Tsujita, H., Kobayashi, T., Higuchi, T., Akane, A., and Nasu, M. Evaluation of prostate-specific antigen (PSA) membrane test for the forensic identification of semen, Legal Medicine (2001) 3(3):171-176.

Fingerprints

295. Abraham J., Kwan P., Champod C., Lennard C., Roux C., 2012. An AFIS Candidate List Centric Fingerprint Likelihood Ratio Model based on Morphometric and Spatial Analyses (MSA). In: Yang J., Xie S. J. (eds.) New Trends and Developments in Biometrics. INTECH, pp. 221-250.
296. Abraham, J., Champod, C., Lennard, C. and Roux, C., 2013. Modern statistical models for forensic fingerprint examinations: A critical review.Forensic science international, 232(1), pp.131-150.

297. Abraham, J., Champod, C., Lennard, C. and Roux, C., 2013. Spatial analysis of corresponding fingerprint features from match and close non-match populations. Forensic science international, 230(1), pp.87-98.
298. Alessandrini, F., Cecati, M., Pesaresi, M., Turchi, C., Carle, F., and Tagliabracci, A. (2003) Fingerprints as evidence for a genetic profile: morphological study on fingerprints and analysis of exogenous and individual factors affecting DNA typing, Journal of Forensic Sciences 48(3):586-592.
299. Aljamea, M., Athar, T., Iliopoulos, C., Pissis, S., and Rahman, M.S., 2015. A novel pattern matching approach for fingerprint-based authentication. Patterns 2015. IARIA, pp. 45-49.
300. Alonso-Fernandez, F., Fierrez, J., Ortega-Garcia, J., Gonzalez-Rodriguez, J., Fronthaler, H., Kollreider, K., and Bigun, J., "A Comparative Study of Fingerprint Image-Quality Estimation Methods," Information Forensics and Security, IEEE Transactions on, vol. 2 (4), pp. 734-743, 2007.
301. Alonso-Fernandez, F., Roli, F., Marcialis, G. L., Fierrez, J., and Ortega-Garcia, J., "Comparison of Fingerprint Quality Measures Using an Optical and a Capacitive Sensor," in Biometrics: Theory, Applications, and Systems, 2007. BTAS 2007. First IEEE International Conference on, 2007, pp. 1-6.
302. An Analysis of Standards in Fingerprint Identification. FBI Law Enforcement Bulletin. 1972 46 (6), 1-6.
303. Anthonioz, A. and Champod, C., 2014. Integration of pore features into the evaluation of fingerprint evidence. Journal of forensic sciences, 59(1), pp.82-93.
304. Anthonioz, A., Egli, N., Champod, C., Neumann, C., Puch-Solis, R., and Bromage-Griffiths, A., "Investigation of the Reproductibility of Third-Level Characteristics," Journal of Forensic Identification, vol. 61 (2), pp. 171-192, 2011.
305. Anthonioz, N.E. and Champod, C., 2014. Evidence evaluation in fingerprint comparison and automated fingerprint identification systems—Modeling between finger variability. Forensic science international, 235, pp.86-101.
306. Arunalatha, J.A., Tejaswi, V., Shaila, K., Anvekar, D., Venugopal, K.R., Iyengar, S.S., and L.M. Patnaik. "FIVDL: Fingerprint Image Verification using Dictionary Learning." *Procedia Computer Science*, Vol. 54 (2015): 482-490.
307. Ashbaugh, D. R. (1999). Qualitative-Quantitative Friction Ridge Analysis – An Introduction to Basic and Advanced Ridgeology. Boca Raton, CRC Press.
308. Ashbaugh, D. R., "La Poroscopie," La gazette de la Gendarmerie Royale du Canada, vol. 45 (2), pp. 12-17, 1983.
309. Babler, W. J. (1979). Quantitative Differences in Morphogenesis of Human Epidermal Ridges. Dermatoglyphics – Fifty Years Later. W. Wertelecki, C. C. Plato and N. W. Paul. New York, Alan R. Liss Inc. XV (N°6): 199-208.
310. Babler, W. J., "Embryologic Development of Epidermal Ridges and Their Configurations," in Dermatoglyphics – Science in Transition. vol. 27 (2), C. C. Plato, R. M. Garruto, B. A. Schaumann, and N. W. Paul, Eds. New York: Wiley-Liss, 1991, pp. 95-112.
311. Bailey, M., Bradshaw, R., Francese, S., Salter, T., Costa, C., Ismail, M., Webb, R., Bosman, I., Wolff, K., de Puit, M., 2015. Rapid detection of cocaine, benzoylecgonine and methylecgonine in fingerprints using surface mass spectrometry. Analyst, 140, pp.6254-6259.
312. Barnes, J. G. (2011). History. The fingerprint sourcebook. E. H. Holder, L. O. Robinson and J. H. Laub. Washington, DC, U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice.
313. Bishop, B. (2012). Frequency of Selected Hand Printing Characteristics Occurring within a National Population: The New International Version Bible Across America. Journal of the American Society of Questioned Document Examiners. 15(2), pp.23-26.
314. Black, J. P. Pilot Study: The Application of ACE-V to Simultaneous (Cluster) Impressions. Journal of Forensic Identification. 2006, 56 (6), 933 - 971.
315. Black, J.P. "Is there a need for 100% verification (review) of latent print examination conclusions?" *Journal of Forensic Identification*, Vol. 62, No.1 (2012): 80-100.

316. Black, S., MacDonald-McMillan, B., Mallett, X., 2014. The incidence of scarring on the dorsum of the hand. International Journal of Legal Medicine, 128(3), pp. 545-553.
317. Black, S., MacDonald-McMillan, b., Mallett, X., Jackson, G., 2014. The incidence and position of melanocytic nevi for the purposes of forensic image comparison. International Journal of Legal Medicine, 128(3), pp. 535-543.
318. Blomeke, C. R., Modi, S. K., and Elliott, S. J., "Investigating the Relationship between Fingerprint Image Quality and Skin Characteristics," in 42nd Annual IEEE International Carnahan Conference on Security Technology, Prague, Czech Republic, 2008, pp. 158-161.
319. Bolle, R. M., Connell, J. H., Pankanti, S., Ratha, N. K., and Senior, A. W., Guide to Biometrics. New York: Springer-Verlag, 2004.
320. Bramble SK, Creer KE, et al; 1993 - Ultraviolet Luminescence From Latent Fingerprints, Forensic Science International, 59
321. Budowle, B., Buscaglia, J., and Perlman, R. Review of the Scientific Basis for Friction Ridge Comparisons as a Means of Identification: Committee Findings and Recommendations. Forensic Science Communications. 2006, 8 (1).
322. Busey, T. A. and F. J. Parada (2010). "The Nature of Expertise in Fingerprint Examiners." Psychonomic Bulletin & Review 17(2): 155-160.
323. Busey, T., Yu, C., Wyatte, D., Vanderkolk, J., Parada, F., and Akavipat, R., "Consistency and Variability among Latent Print Examiners as Revealed by Eye Tracking Methodologies," Journal of Forensic Identification, vol. 61 (1), pp. 60-90, 2011.
324. Cabanyes Cordero, D. E., "Annexo: Cálculo De Las Frecuencias De Los Tipos Dactilares," Ciencia policial, vol. 101 pp. 61-69, 2010.
325. Cadd, S., Islam, M., Manson, P., Bleay, S., 2015. Fingerprint composition and aging: A literature review. Science and Justice, 55(4):219-38.
326. Cai, K., Yang, R., Wang, Y., Yu, X., Liu, J., 2013. Super fast detection of latent fingerprints with water soluble CdTe quantum dots. Forensic Science International, 266(1-3): 240-3.
327. Chacko, S; Vaidya, M. The Dermal Papillae and Ridge Pat-terns in Human Volar Skin. *Acta Anatomica (Basel)* 1968, *70* (1), 99–108.
328. Champod, C. (1995). "Edmond Locard-Numerical Standards and "Probable" Identifications." Journal of Forensic Identification 45(2): 136-163.
329. Champod, C. (1996). Reconnaissance automatique et analyse statistique des minuties sur les empreintes digitales. Ph.D. PhD Thesis, Université de Lausanne.
330. Champod, C. (2009). Friction Ridge Examination (Fingerprints): Interpretation of. Wiley Encyclopedia of Forensic Sciences. A. Moenssens and A. Jamieson. Chichester, UK, John Wiley & Sons. 3: 1277-1282.
331. Champod, C. and P. Margot (1997). Analysis of Minutiæ Occurrences in Fingerprints – The Search for NonCombined Minutiæ. Current topics in Forensic Science – Proceedings of the 14th Meeting of the International Association of Forensic Sciences. T. Takatori and A. Takasu, Shunderson Communications, Ottawa. 1: 55-58.
332. Champod, C., "Fingerprints (Dactyloscopy): Standard of Proof," in Encyclopedia of Forensic Sciences, J. Siegel, P. Saukko, and G. Knupfer, Eds. London: Academic Press, 2000, pp. 884-890.
333. Champod, C., "Reconnaissance automatique et analyse statistique des minuties sur les empreintes digitales," PhD in forensic science, Institut de Police Scientifique et de Criminologie, Université de Lausanne, Lausanne, Suisse, 1996.
334. Champod, C., 2015. Fingerprint identification: advances since the 2009 National Research Council report. Phil. Trans. R. Soc. B, 370(1674).
335. Chang, S. and S. N. Srihari (2008). Generative models for fingerprint individuality using ridge model Pattern Recognition, 2008. ICPR 2008. 19th International Conference on.

336. Changlong, J., Hakil, K., Xuenan, C., Eunsoo, P., Junchul, K., Jinsoo, H., and Elliott, S., "Comparative Assessment of Fingerprint Sample Quality Measures Based on Minutiae-Based Matching Performance," in Electronic Commerce and Security, 2009. ISECS '09. Second International Symposium on, 2009, pp. 309-313.
337. Charlton, D., Fraser-Mackenzie, P.A., Dror, I.E., 2010. Emotional experiences and motivating factors associated with fingerprint analysis. Journal of Forensic Science, 55(2):385-93.
338. Chen, F., Huang, X., Zhou, J., 2013. Hierarchical minutiae matching for fingerprint and palmprint identification. IEEE Transactions on Image Processing.
339. Chen, Y. and Jain, A., "Beyond Minutiae: A Fingerprint Individuality Model with Pattern, Ridge and Pore Features," in Advances in Biometrics: Third International Conference, ICB 2009. LNCS 5558, M. Tistarelli and M. S. Nixon, Eds. Berlin-Heidelberg: Springer Verlag, 2009, pp. 523-533.
340. Cole, S. A. (2009). "Forensics without Uniqueness, Conclusions Without Individualization: the New Epistemology of Forensic Identification." Law Probability and Risk 8(3): 233-255.
341. Cole, S.A. "Grandfathering evidence: Fingerprint admissibility rulings from Jennings to Llera Plaza and back again." *41 American Criminal Law Review, 1189* (2004).
342. Cole, S.A. "More than zero: Accounting for error in latent fingerprint identification." *Journal of Criminal Law and Criminology,* Vol. 95, No.3 (2005) 985-1078.
343. Colletto, G. M. D. D., Kolya, M., and Zimberknopf, S., "Diagnosis of Twin Zygosity by Dermatoglyphic Index," Brasil. J. Genetics, vol. 10 (2), pp. 289-299, 1987.
344. Cooney, L. "Latent Print Training to Competency: Is it Time for a Universal Training Program?" *Journal of Forensic Identification*, 60 (2010): 223–58.Wertheim, Kasey. "Letter re: ACE-V: Is it scientifically reliable and accurate?" *Journal of Forensic Identification*; Nov/Dec 2002; 52, 6, pg. 669.
345. Cowger, J. F. Friction Ridge Skin; CRC Press LLC: Boca Raton, FL, 1993, 154-156.
346. Cummins, H. H. and C. Midlo (1943). Finger Prints, Palms and Soles. Philadelphia, Blakiston.
347. Dankmeijer, J., Waltman, J. M., and De Wilde, A. G., "Biological Foundations for Forensic Identifications Based on Fingerprints," Acta Morphol. Neerl.-Scand., vol. 18 (1), pp. 67-83, 1980.
348. Dass, S. C., "Assessing Fingerprint Individuality in Presence of Noisy Minutiae," Information Forensics and Security, IEEE Transactions on, vol. 5 (1), pp. 62-70, 2010.
349. Dass, S. C., Pankanti, S., Prabhakar, S., and Zhu, Y., "Individuality of Fingerprints," in Encyclopedia of Biometrics, S. Z. Li and A. Jain, Eds. New York: Springer Verlag, 2009, pp. 741-751.
350. Dass, S. C., Y. Zhu, et al. (2005). "Statistical models for assessing the individuality of fingerprints." Automatic Identification Advanced Technologies, 2005. Fourth IEEE Workshop on: 3-9.
351. De Alcaraz-Fossoul, J., Mestres Patris, C., Balaciart Muntaner, A., Barrot Feixat, C., Gene Badia, M., 2013. Determination of latent fingerprint degradation patterns-a real fieldwork study. International Journal of Legal Medicine, 127(4), pp.857-870.
352. De Alcaraz-Fossoul, J., Roberts, K.A., Feixat, C.B., Hogrebe, G.G., Bardia, M.G., 2016. Fingermark ridge drift. Forensic Science International, 258, pp.26-31.
353. Dhall, J.K., Kapoor, A.K., 2016. Fingerprint ridge density as a potential forensic anthropological tool for sex identification. Journal of Forensic Sciences, 61(2), pp.424-429.
354. Dror, I. E. and Mnookin, J. L., "The Use of Technology in Human Expert Domains: Challenges and Risks Arising from the Use of Automated Fingerprint Identification Systems in Forensic Science," Law Probability and Risk, vol. 9 (1), pp. 47-67, 2010.
355. Dror, I. E. Perceptual, Cognitive, and Psychological Elements Involved in Expert Identification, Friction Ridge Sourcebook, SWGFAST, NIJ, In Press. http://www.ojp.usdoj.gov/nij/pubs-sum/225320.htm
356. Dror, I.E., Champod, C., Langenburg, G., Charlton, D., Hunt, H. and Rosenthal, R., 2011. Cognitive issues in fingerprint analysis: inter-and intra-expert consistency and the effect of a 'target'comparison. Forensic Science International, 208(1), pp.10-17.

357. Dvornychenko, V. N. and Garris, M. D., "Summary of NIST Latent Fingerprint Testing Workshop," U.S. Department of Commerce, National Institute of Standards and Technology, Washington DC 2006, http://fingerprint.nist.gov/latent/ir_7377.pdf.
358. Earwaker, H., Morgan, R.M., Harris, A.J., Hall, L.J., 2015. Fingermark submission decision-making within a UK fingerprint laboratory: Do experts get the marks that they need? Science and Justice, 55(4): 239-47.
359. Egli, N. M. (2009). Interpretation of partial fingermarks using an automated fingerprint identification system. PhD thesis in Forensic Science, University of Lausanne.
360. Egli, N. M., C. Champod, et al. (2007). "Evidence evaluation in fingerprint comparison and automated fingerprint identification systems--Modelling within finger variability." Forensic Science International 167(2-3): 189-195.
361. Egli, N., Moret, S., Bécue, A. and Champod, C., 2013. Fingermarks and other impressions. In 17th Interpol International Forensic Science Managers Symposium, 526, p. 745.
362. Emerson, B., Gidden, J., Lay, J.O.,Durham, B., 2011. Laser desorption/ionization time-of-flight mass spectrometry of triacylglycerols and other components in fingermark samples. Journal of Forensic Sciences, 56(2), pp.381-389.
363. Erlikhman, G., 2013. Fingertip matching expertise and its determinants.
364. Espinoza, M. and Champod, C., 2011, November. Using the number of pores on fingerprint images to detect spoofing attacks. In Hand-Based Biometrics (ICHB), 2011 International Conference, pp. 1-5.
365. Espinoza, M. and Champod, C., 2011. Risk evaluation for spoofing against a sensor supplied with liveness detection. Forensic Science International, 204(1), pp.162-168.
366. Espinoza, M., Champod, C. and Margot, P., 2011. Vulnerabilities of fingerprint reader to fake fingerprints attacks. Forensic Science International, 204(1), pp.41-49.
367. Evett, I.W., and R.L. Williams. "Review of the 16 point fingerprint standard in England and Wales." *Forensic Science International*, Vol. 46, No. 1 (1996): 49-–73.
368. Expert Working Group on Human Factors in Latent Analysis, "Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach," U.S. Department of Commerce, National Institute of Standards and Technology, Washington DC, 2012.
369. Fairley, C., Bleay, S.M., Sears, V.G., NicDaeid, N., 2012. A comparison of multi-metal deposition processes utilising gold nanoparticles and an evaluation of their application to 'low yield' surfaces for finger mark development. Forensic Science Internationa, 217(1-3):5-18.
370. Faulds, H. On the Skin—Furrows of the Hand. *Nature* 1880
371. FBI Laboratory Latent Print Operations Manual Examining Friction Ridge Prints, Issue Date: 5/24/11, Revision 5
372. Federal Bureau of Investigation. Laboratory Division. *Latent Print Operations Manual: Standard Operating Procedures for Examining Friction Ridge Prints*. FBI Laboratory, Quantico, Virginia, 2007 (updated May 24, 2011).
373. Federal Bureau of Investigation. *The Science of Fingerprints*. U.S. Government Printing Office. (1984): p. iv.
374. Ferguson, L.S., Wulfert, F., Wolstenholme, R., Fonville, J.M., Clench, M.R., Carolan, V.A., Francese, S., 2012. Direct detection of peptides and small proteins in fingermarks and determination of sex by MALDI mass spectrometry profiling. Analyst, 137(20), pp.4686-4692.
375. Ferguston, L.S., Creasey, S., Wolstenholme, R., Clench, M.R., Francese, S., 2013. Efficiency of the dry-wet method for the MALDI-MSI analysis of latent fingermarks.
376. Fieldhouse, S.J., Kalantzis, N., Platt, A., 2011. Determination of the sequence of latent fingermarks and writing or printing on white office paper. Forensic Science International, 206(1-3), pp.155-160.
377. Fournier, N.A., Ross, A.H., 2015. Sex, Ancestral, and pattern type variation of fingerprint minutiae: A forensic perspective on anthropological dermatoglyphics. American Journal of Physical Anthropology.

378. Francese, S., 2016. Techniques for fingermarks analysis using MALDI MS: A practical overview. Advances in MALDI and Laser-Induced Soft Ionization Mass Spectrometry, pp.93-128.
379. Francese, S., Bradshaw, R., Ferguson, L.S., Wolstenholme, R., Clench, M.R., Bleay, S., 2013. Beyond the ridge pattern: multi-informative analysis of latent fingermarks by MALDI mass spectrometry. Analyst, 138(15), pp.4215-4228.
380. Fraser-Mackenzie, P., Dror, I., Wertheim, K., "Cognitive and contextual influences in determination of latent fingerprint suitability for identification judgments," Science & Justice, vol. 53 (3), pp. 144-153, 2013.
381. Frick, A.A., Childlow, G., Lewis, S.W., van Bronswijk, W., 2015. Investigations into the initial composition of latent fingermark lipids by gas chromatography-mass spectrometry. Forensic Science International, 254, pp.133-147.
382. Fritz, P., Frick, A. A., Bronswijk, W. van, Lewis, S. W., Beaudoin, A., Bleay, S., & Lennard, C. 2015. Variability and subjectivity in the grading process for evaluating the performance of latent fingermark detection techniques. Journal of Forensic Identification. 65, Issue 5, pp.851 – 867.
383. Galton, F., Finger Prints. London: Macmillian and Co., 1892.
384. Gao, Q., Zhang, X., 2012. A study of distortion effects on fingerprint matching. Scientific & Academic publishing, 2(3): 37-42.
385. Garrett, R. J. (2009). Memo to IAI members. Metuchen, NJ, The International Association for Identification.
386. Gaudes, C. Digit Determination. Identification Canada. 2002, 25 (4), 11-15.
387. Girod, A., Ramotowski, R., Weyermann, C., 2012. Composition of fingermark residue: a qualitative and quantitative review. Forensic Science International, 223(1-3), pp.10-24.
388. Girod, A., Weyermann, C., 2014. Lipid composition of fingermark residue and donor classification using GC/MS. Forensic Science International, 238, pp.68-82
389. Girod, A., Xiao, L., Reedy, B., Roux, C., Weiyermann, C., 2015. Fingermark initial composition and aging using Fourier transporm infrared microscopy (μ-FTIR). Forensic Science International, 254, pp.185-196.
390. Gómez Marín, J., Ramón Ramón, M. Á., Gonzáles Arrieta, A., and García Sánchez, L. J., "Estudio De Las Frecuencias Fenotípicas De Los Puntos Característicos En Dactilogramas," Ciencia policial, vol. 101 pp. 5-60, 2010.
391. González Amoros, B., de Puit, M., 2014. A model study into the effects of light and temperature on the degradation of fingerprint constituents. Science and Justice, 54(5): 346-50.
392. Gray, L., "Chapter 12: Quality Assurance," in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011, http://www.ncjrs.gov/pdffiles1/nij/225332.pdf.
393. Groeneveld, G., de Pui, M., Bleay, S., Bradshaw, R., Francese, S., 2015. Detection and mapping of illicit drugs and their metabolites in fingermarks by MALDI MS and compatibility with forensic techniques. Scientific Reports, 5, p. 11716.
394. Gupta, A., Buckley, K., and Sutton, R., "Latent Fingermark Pore Area Reproducibility," Forensic Science International, vol. 179 (2-3), pp. 172-175, 2008.
395. Gutiérrez, Esperanza, Virginia Galera, Jose Manuel Martínez, and Concepción Alonso. "Biological Variability of the Minutiae in the Fingerprints of a Sample of the Spanish Population." Forensic Science International 172, no. 2-3 (2007): 98-105.
396. Gutièrrez-Redomero, E., Alonso-Rodrìguez, C., Hernandez-Hurtado, L. E., and Rodrìguez-Villalba, J. L., "Distribution of the Minutiae in the Fingerprints of a Sample of the Spanish Population," Forensic Science International, vol. 208 (1-3), pp. 79-90, 2011.
397. Gutiérrez-Redomero, E., Alonso, M.C., Dipierrie, J.E., 2011. Sex differences in fingerprint ridge density in the Mataco-Mataguayo population. Journal of Comparative Human Biology, 62(6), pp.487-99.

398. Gutiérrez-Redomero, E., Alonso-Rodríguez, C., 2013. Sexual and topological differences in palmprint and ridge density in the Caucasian Spanish population. Forensic Science International, 229(1-3), p. 159.e1-10.
399. Gutiérrez-Redomero, E., Rivaldería, N., Alonso-Rodríguez, C., Martin, L.M., Dipierrie, J.E., Fernández-Peire, M.A., Morillo, R., 2012. Are there population differences in minutiae frequencies? A comparative study of two Argentinian population samples and one Spanish sample. Forensic Science International, 222(1-3), pp.266-276.
400. Gutiérrez-Redomero, E., Sánchez-Andrés, A., Rivaldería, N., Alonso-Rodríguez, C., Dipierri, J.E., Martín, L.M., 2013. A comparative study of topological and sex differences in fingerprint ridge density in Argentinian and Spanish population samples. Journal of Forensic and Legal Medicine, 20(5), pp.419-429.
401. Gutowski, S. (2006). "Error rates in fingerprint examination: The view in 2006." The Forensic Bulletin (Autumn 2006): 18-19.
402. Hale, A. (1952). "Morphogenesis of Volar Skin in the Human Fetus." American Journal of Anatomy 91(1): 3-43.
403. Hall, L., Player, E., "Will the introduction of an emotional context affect fingerprint analysis and decisionmaking?" Forensics Science International, vol. 181 (1-3), pp. 36-39, 2008.
404. Hall, L.J. and Player, E., The value of practitioner research in the field of fingerprint analysis, Forensic Science International, 191, 2009.
405. Haylock, S. E., "Abnormalities in Dermatoglyphics," Fingerprint Whorld, vol. 12 (47), pp. 71-75, 1987.
406. Hazarika, P., Jickells, S.M., Wolff, K., Russell, D.A., 2010. Multiplexed detection of metabolites of narcotic drugs from a single latent fingermark. Analytical Chemistry, 82(22), pp.9150-9154.
407. Henry, E. R. (1900). Classification and Uses of Finger Prints. London, Georges Routledge.
408. Herschel, W. J. *The Origin of Finger-Printing;* Oxford University Press: London, 1916
409. Hicklin, R. Austin, JoAnn Buscaglia, and Maria Antonia Roberts. "Assessing the Clarity of Friction Ridge Impressions." Forensic Science International 226 (2013): 106-17.
410. Hicklin, R.A., 2011. Latent fingerprint quality: A survey of examiners. Journal of Forensic Identification, 61(4), pp.385–419.
411. Holt, S. B. (1968). The Genetics of Dermal Ridges. Springfield, Illinois, Charles C. Thomas.
412. Hutchins, L. A., "Chapter 5: Systems of Friction Ridge Classification," in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011, http://www.ncjrs.gov/pdffiles1/nij/225325.pdf.
413. Huynh, C., Brunelle, E., Halámková, L., Agudelo, J., Halamek, J., 2015. Forensic identification of gender from fingerprints. Analytical Chemistry, 87(22), pp.11531-11536.
414. Indovina, M., Hicklin, R. A., and Kiebuzinski, G. I., "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature [Sets Evaluation #1]," U.S. Department of Commerce, National Institute of Standards and Technology, Washington DC, NISTIR 7775 2011, http://fingerprint.nist.gov/standard/cdeffs/Docs/ELFT-EFS_PreliminaryReport_DRAFT_2010-01-26b.pdf.
415. Indovina, M., V. Dvornychenko, E. Tabassi, G. Quinn, P. Grother, S. Meagher, and M. Garris. "Elft Phase II -an Evaluation of Automated Latent Fingerprint Identification Technologies." Washington DC: National Institute of Standard and Technology, 2009.
416. Indovina, M., V. Dvornychenko, R. A. Hicklin, and George I. Kiebuzinski. "ELFT-EFS Evaluation of Latent Fingerprint Technologies: Extended Feature Sets [Evaluation #2]." National Institute of Standards and Technology, U.S. Department of Commerce, 2012.
417. Interpol European Expert Group on Fingerprint Identification II - IEEGFI II, "Part 2: Detailing the Method Using Common Terminology and through the Definition and Application of Shared Principles,"

Interpol, Lyon 2004, http://www.interpol.int/Public/Forensic/fingerprints/WorkingParties/IEEGFI2/default.asp.

418. Jackson, G., and Black, S., 2014. Use of data to inform expert evaluative opinion in the comparison of hand images—the importance of scars. International Journal of Legal Medicine, 128(3), pp. 555-563.
419. Jain, A. K. and Feng, J., "Latent Fingerprint Matching," Pattern Analysis and Machine Intelligence, IEEE Transactions on, vol. 33 (1), pp. 88-100, 2011.
420. Jain, A. K., "Automatic Fingerprint Matching Using Extended Feature Set," National Institute of Justice, 235577, August 2011, http://www.ncjrs.gov/pdffiles1/nij/grants/235577.pdf.
421. Jain, A. K., S. Prabhakar, et al. (2002). "On the Similarity of Identical Twin Fingerprints." Pattern Recognition 35(11): 2653-2663.
422. James, R.M., Altamimi, M.J., 2015. The enhancement of friction ridge detail on brass ammunition casings using cold patination fluid. Forensic Science International, 257, pp.385-392.
423. Kalka, N., Hicklin, R.A., 2014. On relative distortion in fingerprint comparisons. Forensic Science International, 244, pp.78-84.
424. Kanchan, T., Krishan, K., Aparna, K.R., Shyamsundar, S., 2013. Is there a sex difference in palm print ridge density? Medicine, Science, and the Law, 53(1), pp.33-39.
425. Kaplan-Sandquist, K.A., LeBeau, M.A., Miller, M.L., 2015. Evaluation of Four Fingerprint Development Methods for Touch Chemistry Using Matrix-Assisted Laser Desorption Ionization/Time-of-Flight Mass Spectrometry. Journal of Forensic Science, 60(3), 611-618.
426. Kassin, S., Dror, I., Kukucka, J., "The forensic confirmation bias: Problems, perspectives, and proposed solutions," Journal of Applied Research in Memory and Cognition, vol. 2 (1), pp. 42-52, 2013.
427. Kaushal, N., Kaushal, P., 2011. Human identification and fingerprints: A review. Journal of Biometrics & Biostatistics, 2:123.
428. Kellman, P., Mnookin, J., Erlikhman, G., Garrigan, P., Ghose, T., Mettler, E., Charlton, D., Dror, I., 2014. Forensic Comparison and Matching of Fingerprints: Using Quantitative Image Measures for Estimating Error Rates through Understanding and Predicting Difficulty. PloS One, 9(5), p. e94617.
429. Koehler, J. J., "Fingerprint Error Rates and Proficiency Tests: What They Are and Why They Matter," Hasting Law Journal, vol. 59 pp. 1077-1098, 2008.
430. Koenig, A., Girod., A., Weyermann, C., 2011. Identification of wax esters in fingermark residues by GC/MS and their potential use as aging parameters. Journal of Forensic Identification 61 (6) (2011) pp.652-676.
431. Komarinski, P. (2005). Automated Fingerprint Identification Systems (AFIS). New York, Elsevier Academic Press.
432. Koristka, C., N. Nürnberger, and G. Georgi. "Zur Auftretenshäufigkeit Von Minuzien Nach Form und Lage Im Fingerbeerenbereich." Kriminalistik und forensische Wissenchaften 35 (1979): 21-30.
433. Krishan, K., Kanchan, T., Ngangom, C., 2013. A study of sex differences in fingerprint ridge density in a North Indian young adult population. Journal of Forensic and Legal Medicine, 20(4), pp.217-222.
434. Krishan, K., Kanchan, T., Sharma, R., Pathania, A., 2014. Variability of palmprint ridge density in a North Indian population and its use in inference of sex in forensic examinations. Journal of Comparative Human Biology, 65(6), pp.476-88.
435. Kryszczuk, K. M., A. Drygajlo, et al. (2004). Study of the Distinctiveness of Level 2 and Level 3 Features in Fragmentary Fingerprint Comparison. Biometric Authentication. Berlin / Heidelberg, Springer. LNCS 3087: 124-133.
436. Kücken, M. and Champod, C., 2013. Merkel cells and the individuality of friction ridge skin. Journal of theoretical biology, 317, pp.229-237.
437. Kücken, M. U., "Models for Fingerprint Pattern Formation," Forensic Science International, vol. 171 (2-3), pp. 85-96, 2007.

438. Kumbnani, H. K., "Dermatoglyphics: A Review," in Anthropology Today: Trends, Scope and Applications. vol. The Anthropologist Special Volume No. 3, V. Bhasin and M. K. Bhasin, Eds. New Delhi: KRE publishers, 2007, pp. 285-295.
439. Langenburg, G. (2004). "Pilot Study: A Statistical Analysis of the ACE-V Methodology - Analysis Stage." Journal of Forensic Identification 54(1): 64-79.
440. Langenburg, G. (2009). "A performance study of the ACE-V process: A pilot study to measure the accuracy, precision, reproducibility, repeatability, and biasability of conclusions resulting from the ACE-V process." Journal of Forensic Identification 59(2): 219-257.
441. Langenburg, G. (2011). Scientific research supporting the foundations of friction ridge examinations. The fingerprint sourcebook. E. H. Holder, L. O. Robinson and J. H. Laub. Washington, DC, U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice.
442. Langenburg, G. (2012). A Critical Analysis and Review of the ACE-V Process. Doctoral Dissertation, University of Lausanne, Switzerland.
443. Langenburg, G., "A Method Performance Pilot Study: Testing the Accuracy, Precision, Repeatability, Reproducibility, and Biasability of the ACE-V Process," Journal of Forensic Identification, vol. 59 (2), pp. 219-257, 2009.
444. Langenburg, G., "Chapter 14: Scientific Research Supporting the Foundations of Friction Ridge Examinations," in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011, http://www.ncjrs.gov/pdffiles1/nij/225334.pdf.
445. Langenburg, G., 2012. A Critical Analysis and Study of the ACE-V Process, Doctoral Thesis, Switzerland, University of Lausanne.
446. Langenburg, G., and Champod, C., 2011. The GYRO system—a recommended approach to more transparent documentation. Journal of Forensic Identification, 61(4), pp.373-384
447. Langenburg, G., C. Champod, et al. (2010). Informing the Judgments of Fingerprint Analysts Using Quality Metric and Statistical Assessment Tools. S. R. Report, Midwest Forensic Resource Center. November 2010.
448. Langenburg, G., Champod, C. and Genessay, T., 2012. Informing the judgments of fingerprint analysts using quality metric and statistical assessment tools. Forensic science international, 219(1), pp.183-198.
449. Langenburg, G., Champod, C., and Wertheim, P., "Testing for Potential Contextual Bias Effects During the Verification Stage of the ACE-V Methodology When Conducting Fingerprint Comparisons," Journal of Forensic Sciences, vol. 54 (3), pp. 571-582, 2009.
450. Langenburg, G., Hall, C., Rosemarie, Q., 2015. Utilizing AFIS searching tools to reduce errors in fingerprint casework. Forensic Science International, 257:123-33.
451. Langenburg, G., Bochet, F., Ford, S., 2014. A report of statistics from latent print casework. Forensic Science & Policy Management, 5(1--2):15–37.
452. Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach, NIST Interagency/Internal Report (NISTIR) – 7842.
453. Latent Print Unit Quality Assurance Manual Blind Verification, Issue Date: 8/7/13, Revision 2
454. Lauzon, N., Dufresne, M., Chauhan, V., Chaurand, P., 2015. Development of laser desorption imaging mass spectrometry methods to investigate the molecular composition of latent fingermarks. Journal of American Society for Mass Spectrometry, 26(6), pp.876-86.
455. Lee, H. C. and Gaensslen, R. E., "Methods of Latent Fingerprint Development," in Advances in Fingerprint Technology, second ed, H. C. Lee and R. E. Gaensslen, Eds. Boca Raton: CRC Press, 2001, pp. 105-175.
456. Li, Z., Han, Z., and Fu, B., "A Novel Method for the Fingerprint Image Quality Evaluation," in Computational Intelligence and Software Engineering, 2009. CiSE 2009. International Conference on, 2009, pp. 1-4.

457. Lin, C. H., J. H. Liu, et al. (1982). "Fingerprint Comparison I: Similarity of Fingerprints." Journal of Forensic Sciences 27(2): 290-304.
458. Lindley, D. V. (1977). "A Problem in Forensic Science." Biometrika 64(2): 207-213.
459. Liu, S., Champod, C., Wu, J. and Luo, Y., 2015. Study on Accuracy of Judgments by Chinese Fingerprint Examiners. Journal of Forensic Science and Medicine, 1(1), p.33.
460. Liu, Y. and Srihari, S., "A Computational Discriminability Analysis on Twin Fingerprints," in Computational Forensics, 2009, pp. 43-54, http://dx.doi.org/10.1007/978-3-642-03521-0_5.
461. Loesch, D. Z. and Martin, N. G., "Relationships between Minute Characteristics of Finger Ridges and Pattern Size and Shape," Annals of Human Biology, vol. 11 (2), pp. 125-132, 1984.
462. Loesch, D. Z., Quantitative Dermatoglyphics: Classification, Genetics and Pathology. Oxford: Oxford University Press, 1983.
463. MacArthur, J. W., "Reliability of Dermatoglyphics in Twin Diagnosis," Human Biology, vol. 10 (1), pp. 12-35, 1938.
464. Maceo, A. V. (2009). "Qualitative Assessment of Skin Deformation: A Pilot Study." Journal of Forensic Identification 59(4): 390-440.
465. Maceo, A. V. (2011). Anatomy and phyiology of adult friction ridge skin. The fingerprint sourcebook. E. H. Holder, L. O. Robinson and J. H. Laub. Washington, DC, U.S. Dept. of Justice, Office of Justice Programs, National Institute of Jfiber
466. ustice.
467. Maceo, A. V., "Chapter 2: Anatomy and Physiology of Adult Friction Ridge Skin," in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011, http://www.ncjrs.gov/pdffiles1/nij/225322.pdf.
468. Mankevich, A. Blind verification; Does it compromise the conformance of ACE-V methodology to the scientific method? Chesapeake Examiner 45(2), 2007.
469. Matuszewski, S., Szafalowicz, M., 2013. A simple computer-assisted quantification of contrast in a fingerprint. Journal of Forensic Sciences, 58(5), pp.1310-1313.
470. Mavalwala, J., Dermatoglyphics, an International Bibliography. Chicago: Mouton Publishers, 1977.
471. Merkel, R., 2015. Latent fingerprint aging from hyperspectral perspective: First qualitative degradation studies using UV/VIS spectroscopy. Ninth international conference on IT security incident management & IT forensics (IMF), pp.121-135.
472. Merkel, R., Dittmann, J., Vielhauer, C., 2011. Approximation of a mathematical aging function for latent fingerprint traces based on first experiments using a Chromatic White Light (CWL) sensor and the binary aging feature, in: B. de Decker et al. (Eds.), CMS 2011, LNCS 7025, IFIP International Federation for Information Processing
473. Merkel, R., Gruhn, S., Dittmann, J., Vielhauer, C., Brautigam, A., 2012. General fusion approaches for the age determination of latent fingerprint traces: results for 2D and 3D binary pixel feature fusion. Three dimension image processing (3DIP) and applications II, 82900U.
474. Merkel, R., Gruhn, S., Dittmann, J., Vielhauer, C., Bräutigam, A., 2012. On non-invasive 2D and 3D chromatic white light image sensors for age determination of latent fingerprints. Forensic Science International, 222(1-3), pp.52-70.
475. Method for Fingerprint Identification. Part II: Detailing the method using common terminology and through the definition and application of shared principles. Interpol European Expert Group on Fingerprint Identification. www.interpol.int/Public/Forensic/fingerprints/WorkingParties/IEEGFI2/default.asp
476. Michalski, S., Shaler, R., Dorman, FL., 2013. The evaluation of fatty acid ratios in latent fingermarks by gas chromatography/mass spectrometry (GC/MS) analysis. Journal of Forensic Sciences, 58 (suppl 1), pp.S215-S220.

477. Modi, S. K., Elliott, S. J., Whetsone, J., and Hakil, K., "Impact of Age Groups on Fingerprint Recognition Performance," in Automatic Identification Advanced Technologies, 2007 IEEE Workshop on, 2007, pp. 19-23.
478. Montagna, W. and P. F. Parakkal (1974). The Structure and Function of Skin. London, Academic Press.
479. Moret, S., Spindler, X., Lennard, C., Roux, C., 2015. Microscopic examination of fingermark residues: Opportunities for fundamental studies. Forensic Science International, 255, pp.28-37.
480. Morrison, G.S. and Stoel, R.D., 2014. Forensic strength of evidence statements should preferably be likelihood ratios calculated using relevant data, quantitative measurements, and statistical models–a response to Lennard (2013) Fingerprint identification: how far have we come? Australian Journal of Forensic Sciences, 46(3), pp.282-292.
481. Moses, K., "Chapter 6: Automatic Fingerprint Identification Systems (AFIS)," in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011, http://www.ncjrs.gov/pdffiles1/nij/225326.pdf.
482. Mundoriff, A.Z., Bartelink, E.J., Murad, T.A., 2014. Sexual dimorphism in finger ridge breadth measurements: a tool for sex estimation from fingerprints. Journal of Forensic Sciences, 59(4), pp.891-7.
483. Muramoto, S., Sisco, E., 2015. Strategies for potential age dating of fingerprints through the diffusion of sebum molecules on a nonporous surface analyzed using time-of-flight secondary ion mass spectrometry. Analytical Chemistry, 87(16):8035-8.
484. Mustonen, V., Hakkarainen, K., Tuunainen, J., Pohjola, P., 2015. Discrepancies in expert decision-making in forensic fingerprint examination. Forensic Science International, 254:215-26.
485. Nakamura, A., Okuda, H., Nagaoka, T., Akiba, N., Kurosawa, K., Kuroki, K., Ichikawa, F., Torao, A., Sota, T., 2015. Portable hyperspectral imager with continuous wave green laser for identification and detection of untreated latent fingerprints on walls. Forensic Science International, 254:100-5.
486. Nandan, S.R.K., Bandaru, B.K., Babu, A., Chundru, N.S.V., Thankappan, P., Amudala, R., 2015. A study on association and correlation of lip and finger print pattern analysis for gender identification. Journal of Dr. NTR University of Health Sciences, 4(3), pp.176-181.
487. National Institute of Standards and Technology. "*Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach.*" (2012), available at: www.nist.gov/oles/upload/latent.pdf.
488. National Institute of Standards, American National Standard for Information Systems: Data format for the interchange of fingerprint, facial & other biometric information, ANSI/NIST-ITL 1-2011, 2011. (http://fingerprint.nist.gov/standard)
489. National Research Council (2009). Strengthening Forensic Science in the United States: A Path Forward. Washington, D.C., The National Academies Press.
490. Neumann, C., 2012. Fingerprints at a crime-scene: Statistically certain, or probable? Significance, 9(1): 21-25.
491. Neumann, C., C. Champod, et al. (2006). "Computation of Likelihood Ratios in Fingerprint Identification for Configurations of Three Minutiae." Journal of Forensic Sciences 51(6): 1255-1266.
492. Neumann, C., C. Champod, et al. (2007). "Computation of Likelihood Ratios in Fingerprint Identification for Configurations of Any Number of Minutiae." Journal of Forensic Sciences 52(1): 54-64.
493. Neumann, C., Champod, C., Puch-Solis, R., Egli, N., Anthonioz, A., and Bromage-Griffiths, A., "Computation of Likelihood Ratios in Fingerprint Identification for Configurations of Any Number of Minutiae," Journal of Forensic Sciences, vol. 52 (1), pp. 54-64, 2007.
494. Neumann, C., Champod, C., Yoo, M., Genessay, T. and Langenburg, G., 2013. Improving the Understanding and the Reliability of the Concept of" Sufficiency. Friction Ridge Examination. National Institute of Justice, 12.

495. Neumann, C., Champod, C., Yoo, M., Genessay, T. and Langenburg, G., 2015. Quantifying the weight of fingerprint evidence through the spatial relationship, directions and types of minutiae observed on fingermarks.Forensic science international, 248, pp.154-171.
496. Neumann, C., Champod, C., Yoo, M., Genessay, T., and Langenburg, G. (2013), Improving the understanding and the reliability of the concept of “sufficiency” in friction ridge examination, National Institute of Justice, Washington DC. https://www.ncjrs.gov/pdffiles1/nij/grants/244231.pdf
497. Neumann, C., Evett, I. W., and Skerrett, J., "Quantifying the Weight of Evidence from a Forensic Fingerprint Comparison: A New Paradigm," Journal of the Royal Statistical Society, vol. 175 (Part 2), pp. 1-26, 2012.
498. Neumann, C., Evett, I.W. and Skerrett, J., 2012. Quantifying the weight of evidence from a forensic fingerprint comparison: a new paradigm. Journal of the Royal Statistical Society: Series A (Statistics in Society), 175(2), pp.371-415.
499. Neumann, C., I. Evett, et al. (2011). "Quantitative assessment of evidential weight for a fingerprint comparison. I. Generalisation to the comparison of a mark with set of ten prints from a suspect." Forensic Science International 207(1-3): 101-105.
500. Neumann, C., Mateos-Garcia, I., Langenburg, G., Kostroski, J., Skerrett, J.E. and Koolen, M., 2011. Operational benefits and challenges of the use of fingerprint statistical models: a field study. Forensic Science International, 212(1), pp.32-46.
501. Neumann, Cedric, Christophe Champod, Mina Yoo, Thibault Genessay, and Glenn Langenburg. "Quantifying the Weight of Fingerprint Evidence through the Spatial Relationship, Directions and Types of Minutiae Observed on Fingermarks." Forensic Science International 248, no. 0 (3// 2015): 154-71.
502. Neumann, Cédric. "Statistics and Probabilities as a Means to Support Fingerprint Examination." In Lee and Gaensslen's Advances in Fingerprint Technology, edited by Robert S. Ramotowski, 407-52. Boca Raton: CRC Press, 2012.
503. NIST (National Institute of Standards and Technology) and Expert Working Group on Human Factors in Latent Print Analysis (2012). Latent Print Examination and Human Factors: Improving the Practice through a Systems Approach. M. Taylor and S. Ballou. Gaithersburg, MD.
504. Nithin, M.D., Manjunatha, B., Preethi, D.S., Balaraj, B.M., 2011. Gender differentiation by finger ridge count among South Indian Population. Journal of Forensic and Legal Medicine, 18(2), pp.79-81.
505. Okajima, M. (1967). "Frequency of Epidermal-Ridge Minutiae in the Calcar Area of Japanese Twins." American Journal of Human Genetics 19(5): 660-673.
506. Okajima, M. (1970). "Frequency of Forks in Epidermal-ridge Minutiae on the Finger Print." American Journal of Physical Anthropology 32(1): 41-48.
507. Okajima, M. (1975). "Development of Dermal Ridges in the Fetus." Journal of Medical Genetics 12(3): 243-250.
508. Okajima, M. and Usukara, K., "Quantitative and Genetic Features of Epidermal Ridge Minutiae on the Palm of Twins,” Human Heredity, vol. 34 pp. 285-290, 1984.
509. Oktem, H., Kurkcuoqlu, A., Pelin, I.C., Yazici, A.C., Aktas, G., Altunay, F., 2015. Sex differences in fingerprint ridge density in a Turkish young adult population: a sample of Baskent University. Journal of Forensic and Legal Medicine, 32, pp.34-38.
510. Olsen, R. D. and Lee, H. C., "Identification of Latent Prints,” in Advances in Fingerprint Technology, second ed, H. C. Lee and R. E. Gaensslen, Eds. Boca Raton: CRC Press, 2001, pp. 41-61.
511. Olsen, R. D., "Occupational Damage and Bad Skin Condition,” in Scott's Fingerprint Mechanics Springfield: Charles C. Thomas, 1978, pp. 80-82.
512. Osterburg, J. W., T. Parthasarathy, et al. (1977). "Development of a Mathematical Formula for the Calculation of Fingerprint Probabilities Based on Individual Characteristics." Journal of the American Statistical Association 72: 772-778.

513. Ostrowski, S. Simultaneous Impressions: Revisiting the Controversy. The Weekly Detail #13. www.clpex.com. November 5, 2001
514. Pacheco, I., Cerchiai, B., and S. Stoiloff. “Miami-Dade research study for the reliability of the ACE-V process: Accuracy & precision in latent fingerprint examinations.” (2014). www.ncjrs.gov/pdffiles1/nij/grants/248534.pdf.
515. Pacheco, I., Cerchiai, B., Stoiloff, S., “Miami-Dade Research Study for the ACE-V Process: Accuracy & Precision in Latent Fingerprint Examinations,” National Institute of Justice, Washington, D.C., 2014.
516. Pankanti, S., S. Prabhakar, et al. (2002). "On the Individuality of Fingerprints." IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI) 24(8): 1010-1025
517. Parsons, N. R., Smith, J. Q., Thönnes, E., Wang, L., and Wilson, R. G., "Rotationally Invariant Statistics for Examining the Evidence from the Pores in Fingerprints,” Law Probability and Risk, vol. 7 (1), pp. 1-14, 2008.
518. Paulino, A. A., Jain, A. K., and Jianjiang, F., "Latent Fingerprint Matching: Fusion of Manually Marked and Derived Minutiae,” in Graphics, Patterns and Images (SIBGRAPI), 2010 23rd SIBGRAPI Conference on, 2010, pp. 63-70.
519. Peirce, C. S. (1877). "The fixation of belief." Popular Science Monthly 12: 1-15.
520. Polski, J., Smith, R., Garrett, R., Ashbaugh, D. R., Babler, W. J., Chamberlain, P., Champod, C., Langenburg, G., Leben, D. A., Martin, K. F., Meagher, S. B., Moenssens, A. A., Norman, J., Taylor, M., Vanderkolk, J. R., and Zeelenberg, A., "The Report of the International Association for Identification, Standardization II Committee,” National Institute of Justice, 233980, March 2011, http://www.ncjrs.gov/pdffiles1/nij/grants/233980.pdf.
521. Polski, J.; Smith, R.; Garrett, R. The Report of the International Association for Identification, Standardization II Committee. Grant no. 2006-DN-BX-K249 awarded by the U.S. Department of Justice, Washington, DC, March 2011.
522. Popa, G., Potorac, R., and Preda, N., "Method for Fingerprints Age Determination,” Romanian Journal of Legal Medicine, vol. 18 (2), pp. 149-154, 2010.
523. Prete, C., Galmiche, L., Quenum-Possy-Berry, F.G., Allain, C., Thiburce, N., Colard, T., 2013. Lumicyano™: a new fluorescent cyanoacrylate for a one-step luminescent latent fingermark development. Forensic Science International, 233(1-3), pp.104-112.
524. Rao, K.P. and Kumar, M.C., 2014. Fingerprint matching based on statistical texture features. Int. J. Comput. Sci. Mob. Comput, 3, pp.34-41.
525. Reed, T., Viken, R. J., and Rinehart, S., A., "High Heritability of Fingertip Arch Patterns in Twin-Pairs,” American Journal of Medical Genetics Part A, vol. 140A (3), pp. 263-271, 2006.
526. Reznicek, M., Ruth, R. M., and Schilens, D. M. (2010). ACE-V and the Scientific Method. Journal of Forensic Identification, 60(1), 87-103.
527. Rivaldería, N., Sánchez-Andrés, Á, Alonso-Rodríguez, C., Dipierri, J.E., Gutiérrez-Redomero, E., 2016. Fingerprint ridge density in the Argentinean population and its application to sex inference: A comparative study. Journal of Comparative Human Biology, 67(1), pp.65-84.
528. Roddy, A. R. and Stosz, J. D., "Fingerprint Features - Statistical Analysis and System Performance Estimates,” Proceedings of the IEEE, vol. 85 (9), pp. 1390-1421, 1997.
529. Ross, A., Shah, J., and Jain, A. K., "From Template to Image: Reconstructing Fingerprints from Minutiae Points,” Pattern Analysis and Machine Intelligence, IEEE Transactions on, vol. 29 (4), pp. 544-560, 2007.
530. Saks, M.J. Concerning L.J. Hall, E. Player, ‘‘Will the introduction of an emotional context affect fingerprint analysis and decision making?’’ Forensic Science International, 191, 2009.
531. Sánchez, L. J., "Estudio De Las Frecuencias Fenotípicas De Los Puntos Característicos En Dactilogramas,” Ciencia policial, vol. 101 pp. 5-60, 2010.

532. Sandbhor, M.A., Deshpande, M.K. and Jahagirdar, S.S., 2014. Cross-correlation Based Algorithm for Fingerprint recognition Using MATLAB. International Journal of Engineering and Technical Research, 2(3), pp.116-118.
533. Sarkar, N. C., Finger Ridge Minutiae: Classification, Distribution and Genetics. Kolkata, India: Anthropologal Survey of India, 2004.
534. Scientific Working Group on Friction Ridge Analysis Study and Technology (SWGFAST), "Standards for Examining Friction Ridge Impressions and Resulting Conclusions, Ver. 1.0," 2011, http://www.swgfast.org/documents/examinations-conclusions/111026_Examinations-Conclusions_1.0.pdf.
535. Sclove, S. L. (1979). "The Occurrence of Fingerprint Characteristics as a Two Dimensional Process." Journal of the American Statistical Association 74: 588-595.
536. Sclove, S. L. (1980). "The Occurrence of Fingerprint Characteristics as a Two Dimensional Poisson Process." Communications in Statistics – Theoretical Methods A7: 675-695.
537. Seweryn, P. (2005). "Frequency of Minutiae on Left and Right Hand Index Fingers [in Polish]." Problemy Kryminalistyki (247): 40-46.
538. Srihari, S. N., H. Srinivasan, et al. (2008). "Discriminability of Fingerprints of Twins." Journal of Forensic Identification 58(1): 109-127.
539. Srihari, S.N. "Quantitative Measures in Support of Latent Print Comparison: Final Technical Report." NIJ Award Number: 2009-DN-BX-K208, University at Buffalo, SUNY, 2013.
540. Srinivasan, H.; Fang, G. (2008). Discriminability of Fingerprints of Twins. Journal of Forensic Identification 58(1): 109-127.
541. Stacey, R.B. "Report on the erroneous fingerprint individualization in the Madrid train bombing case." *Forensic Science Communications*, Vol. 7, No. 1 (2005).
542. Stacey, R.M., A report on the erroneous fingerprint individualization in the Madrid train bombing case. Journal of Forensic Identification, 54, 2004.
543. Stoney, D. A. and J. I. Thornton (1986). "A Critical Analysis of Quantitative Fingerprint Individuality Models." Journal of Forensic Sciences 31(4): 1187-1216.
544. Stoney, D. A. and J. I. Thornton (1987). "A Systematic Study of Epidermal Ridge Minutiæ." Journal of Forensic Sciences 32(5): 1182-1203.
545. Stoney, D. A., "Measurement of Fingerprint Individuality," in Advances in Fingerprint Technology, second ed, H. C. Lee and R. E. Gaensslen, Eds. Boca Raton: CRC Press, 2001, pp. 327-387.
546. Stoney, David A. "Measurement of Fingerprint Individuality." In Advances in Fingerprint Technology, edited by Henry C. Lee and Robert E. Gaensslen. Crc Series in Forensic and Police Science, 327-87. Boca Raton: CRC Press, 2001.
547. Stosz, J. D. and L. A. Alyea (1994). "Automatic System for Fingerprint Authentication Using Pores and Ridge Structures." Automatic Systems for the Identification and Inspections of Humans 2277: 210-223.
548. Stücker, M., Geil, M., Hyeck, S., Hoffman, K., Rochling, A., Memmel, U., and Altmezer, P., "Interpapillary Lines – the Variable Part of the Human Fingerprint," Journal of Forensic Sciences, vol. 46 (4), pp. 857-861, 2001.
549. Su, C. and Srihari, S., "Probability of Random Correspondence for Fingerprints," in Computational Forensics: Third International Workshop, IWCF 2009. LNCS 5718, Z.J. M. H. Geradts, K. Y. Franke and C. J.Veenman, Eds. Berlin-Heidelberg: Springer Verlag, 2009, pp. 55-66.
550. Su, C. and Srihari, S., "Probability of Random Correspondence for Fingerprints," in Computational Forensics: Third International Workshop, IWCF 2009. LNCS 5718, Z.J. M. H. Geradts, K. Y. Franke and C. J. Veenman, Eds. Berlin-Heidelberg: Springer Verlag, 2009, pp. 55-66
551. SWGFAST Document #10 (2013), Standard for Examining Friction Ridge Impressions and Resulting Conclusions (Latent/Tenprint), Ver. 2.0.

552. SWGFAST Document #19 (2012), Standard Terminology of Friction Ridge Examination (Latent/Tenprint),Ver. 4.0.
553. SWGFAST Document #4 Guideline for the Articulation of the Decision-Making Process for the Individualization in Friction Ridge Examination (Latent/Tenprint) Revised Draft for Comment, Ver. 1.0, Issue Date 03/13/13
554. SWGFAST Document #8 (2012), Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACE-V) (Latent), Ver. 2.0.
555. SWGFAST, Quality Assurance Guidelines for Latent Print Examiners, 9/28/06, ver. 3.0.
556. SWGFAST, Standard for a Quality Assurance Program in Friction Ridge Examinations, 9/28/06, Ver. 3.0.
557. SWGFAST, Standard for Simultaneous Impression Examination, 11/17/12, ver 2.0.
558. SWGFAST, Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACEV) (Latent), 2/12/10, ver. 1.0.
559. SWGFAST, Standard for the Documentation of Analysis, Comparison, Evaluation, and Verification (ACEV) (Latent), 9/11/12, ver. 2.0.
560. SWGFAST, Standard for the Technical Review of Friction Ridge Examinations, 9/13/11, ver. 1.0
561. SWGFAST, Standards for Minimum Qualifications and Training to Competency for Friction Ridge Examiner Trainees (Latent/Tenprint), 2/12/10, ver. 1.0.
562. Swofford, H., Steffan, S., Warner, G., Bridge, C., Salyards, J., “Inter- and Intra-Examiner Variation in the Detiction of Friction Ridge Skin Minutiae,” Journal of Forensic Identification, vol. 63 (5), pp. 553-570, 2013.
563. Tangen, J. M., M. B. Thompson, et al. (2011). "Identifying Fingerprint Expertise." Psychological Science 22(8): 995-997.
564. Taylor, S.J., Dutton, E.K., Aldrich, P.R. and Dutton, B.E., 2012. Application of spatial statistics to latent print identifications: towards improved forensic science methodologies. Division of Natural Sciences and Mathematics, Western Oregon University.
565. The Fingerprint Inquiry, 2011. The Fingerprint Inquiry Report. APS Group Scotland. www.thefingerprintinquiryscotland.org.uk
566. Thompson, M., Tangen, J., 2014. The Nature of Expertise in Fingerprint Matching: Experts can do a lot with a little. PLoS One, 9 12: 1-23.
567. Thompson, M., Tangen, J., McCarthy, D., 2013. On expertise in fingerprint identification. Journal of Forensic Sciences.
568. Thompson, M., Tangen, J., McCarthy, D.J., 2014. Human matching performance of genuine crime scene latent fingerprints. Law and Human Behavior, 38(1):84-93.
569. Tietze, S. and Witthuhn, K., Papillarleisten-Struktur Der Menschlichen Handinnenfläche vol. 9. Neuwied: Luchterhand, 2001.
570. Ulery, B. T., Hicklin, R. A., Roberts, M. A., Buscaglia, J., “Changes in latent fingerprint examiners' markup between analysis and comparison,” Forensic Sci Int., 247, pp. 54-61, 2015.
571. Ulery, B. T., R. A. Hicklin, et al. (2011). "Accuracy and reliability of forensic latent fingerprint decisions." Proceedings of the National Academy of Sciences 108(19): 7733-7738.
572. Ulery, B.T., Hicklin, R.A., Buscaglia, J. and Roberts, M.A., 2012. Repeatability and reproducibility of decisions by latent fingerprint examiners. PloS one, 7(3), p.e32800.
573. Ulery, B.T., Hicklin, R.A., Kiebuzinski, G. I., Roberts, M.A., Buscaglia, J., “Understanding the sufficiency of information for latent fingerprint value determinations,” Forensic Science International, vol. 230, pp. 99-106, 2013.
574. Ulery, B.T., Hicklin, R.A., Roberts, M.A., Buscaglia, J., Measuring What Latent Fingerprint Examiners Consider Sufficient Information for Individualization Determinations. PLoS ONE 9(11): e110179. doi:10.1371/journal.pone.0110179, 2014.

575. Ulery, B.T., R.A. Hicklin, M.A. Roberts, J. Buscaglia, "Inter-examiner variation of minutia mark-up on latent fingerprints" was resubmitted to Forensic Science International on Jan 13, 2016 with minor edits.
576. Ulery, B.T., R.A. Hicklin, M.A. Roberts, J. Buscaglia, "Changes in latent fingerprint examiners' markup between analysis and comparison." Forensic Science International 247(2014):54-61. Feb 2015.
577. United States Department of Justice and Office of the Inspector General - Oversight and Review Division, A Review of the FBI's Handling of the Brandon Mayfield Case (Unclassified and Redacted). Washington DC, 2006.
578. United States Department of Justice and Office of the Inspector General - Oversight and Review Division, A Review of the FBI's Progress in Responding to the Recommendations in the Office of the Inspector General Report on the Fingerprint Misidentification in the Brandon Mayfield Case. Washington DC, 2011.
579. van Dam, A., Schwarz, J.C., de Vos, J., Siebes, M., Sijen, T., van Leeuwen, T.G., Aalders, M.C., Lambrechts, S.A., 2014. Oxidation monitoring by fluorescence spectroscopy reveals the age of fingermarks. Angewandte Chemie International Edition, 53(24):6272-5.
580. van der Heide, S., Garcia Calavia, P., Hardwick, S., Hudson, S., Wolff, K., Russell, D.A., 2015. A competitive enzyme immunoassay for the quantitative detection of cocaine from banknotes and latent fingermarks. Forensic Science International, 250, pp.1-7.
581. Vanderkolk, J. (2009). Forensic Comparative Science: Qualitative Quantitative Source Determination of Unique Impressions, Images, and Objects. Burlington, MA, Elsevier Academic Press.
582. Vanderkolk, J. R. (2011). Examination process. The fingerprint sourcebook. E. H. Holder, L. O. Robinson and J. H. Laub. Washington, DC, U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice.
583. Vokey, J., Tangen, J., & Cole, S., On the preliminary psychophysics of fingerprint identification. Quarterly Journal of Experimental Psychology, 62(5), 2009
584. Wein L. M. and Baveja M. (2005) "Using fingerprint image quality to improve the identification performance of the U.S. Visitor and Immigrant Status Indicator Technology Program," Proceedings of the National Academy of Science of the United States of America, 102(21), pp. 7772–7775.
585. Wertheim, K. (2011). Embryology and morphology of friction ridge skin. The fingerprint sourcebook. E. H. Holder, L. O. Robinson and J. H. Laub. Washington, DC, U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice.
586. Wertheim, K. and A. Maceo (2002). "The Critical Stage of Friction Ridge and Pattern Formation." Journal of Forensic Identification 52(1): 35-85.
587. Wertheim, K., "Chapter 3: Embryology and Morphology of Friction Ridge Skin," in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011.
588. Wertheim, K., Langenburg, G., and Moenssens, A., "A Report of Latent Print Examiner Accuracy During Comparison Training Exercises," Journal of Forensic Identification, vol. 56 (1), pp. 55-93, 2006.
589. Wertheim, P. A. (2000). "Scientific Comparison and Identification of Fingerprint Evidence." Fingerprint Whorld 26(101): 95-106.
590. Weyermann, C., Roux, C., Champod, C., 2011. Initial results on the composition of fingerprints and its evolution as a function of time by GC/MS analysis. Journal of Forensic Science, 56(1):102-8.
591. Wightman, G., Emery, F., Austin, C., Andersson, I., Harcus, L., Arju, G., Steven, C., 2015. The interaction of fingermark deposits on metal surfaces and potential ways for visualization. Forensic Science International, 249.
592. Wilder, H. H.; Wentworth, B. *Personal Identification;* The Gorham Press: Boston, 1918
593. Wilder, H. H. and B. Wentworth (1932). Personal Identification – Methods for the Identification of Individuals Living or Dead. Chicago, The Fingerprint Publishing Association.

594. Wilder, I. W. and H. H. Wilder (1904). "The ventral surface of the mammalian chiridium: with special reference to the conditions found in man." Zeitschrift für morphologie und anthropologie 7: 261-368.
595. Wisniewski, P. Comparison of Fingerprints Recovered in a Composite Way. Problemy Kryminalistyki. 2003, 239, 21-29.
596. Yoon, Soweon, Eryun Liu, and Anil K. Jain. "On Latent Fingerprint Image Quality." In Proceedings of the 5th International Workshop on Computational Forensics. Tsukuba, Japan, 2012.
597. Zhang, Q. and Yan, H., 2004. Fingerprint classification based on extraction and analysis of singularities and pseudo ridges. Pattern Recognition, 37(11), pp.2233-2243.
598. Zhang, T., Chen, X., Yang, R., Xu, Y., 2015. Detection of methamphetamine and its main metabolite in fingermarks by liquid chromatography-mass spectrometry. Forensic Science International, 248, pp.10-14.
599. Zhou, R., Zhong, D., Han, J., 2013. Fingerprint identification using SIFT-Based minutia descriptors and improved all descriptor-paring matching. Sensors, 3(3), 3142-3156.

Shoeprint & tire marks

600. Abbott, J. R., “Reproduction of Footprints,” RCMP Quarterly, 9:2, 186-193, 1941.
601. Adair, T. W., Lemay, J., McDonald, A., Shaw, R. & Tewes, R. (2007). The Mount Bierstadt study: An experiment in unique damage formation in footwear. Journal of Forensic Identification, 57 (2), 199-205.
602. Alexandre, G., 1996. Computerized classification of the shoeprints of burglars' soles. Forensic Science International, 82(1), pp.59-65.
603. AlGarni, G. & Hamiane, M. (2008). A novel technique for automatic shoeprint retrieval. Forensic Science International, 181, 10-14.
604. Andalo, F., Calakli, F., Taubin, G., & Goldenstein, S. (2011). Accurate 3D footwear impression recovery from photographs. 4th International Conference on Imaging for Crime Detection and Prevention 2011 (ICDP 2011).
605. Ashley, W. (1996) What shoe was that? The use of computerised image database to assist in identification, Forensic Science International, Volume 82, Issue 1, 7-20
606. Ashley, W., “Shoe and tyre impression evidence within Australian state and teritory jurisdictions” presented at the International symposium on the Forensic Aspects of Footwear and Tire Impression Evidence, FBI Academy, Quantico, VA, June 27 – July 1, 1994.
607. Au, C., Jaskson-Smith, H., Quinones, I., and Daniel, B. Wet powder suspensions as an additional technique for the enhancement of bloodied marks. Forensic Science International. 2011; 204 (1): 13-18. Available online May 24, 2010.
608. Author Unknown, “Footprints and Tire Treads,” FBI Law Enforcement Bulletin, 10 (8): 21-30, 1941.
609. Barton, C. J., Bonanno, D., & Menz, H. B. (2009). Development and evaluation of a tool for the assessment of footwear characteristics. Journal of Foot and Ankle Research, 2:10.
610. Battiest, T., Clutter, S. W., & Mcgill, D. (2016). A Comparison of Various Fixatives for Casting Footwear Impressions in Sand at Crime Scenes. J Forensic Sci Journal of Forensic Sciences.
611. Belser, Ch., Ineichen, M., Pfefferli, P. (1996) Evaluation of the ISAS system after two years of practical experience in forensic police work. Forensic Science International, Volume 82, Issue 1, 53-58
612. Benedict, I., Corke, E., Morgan-Smith, R., Maynard, P., Curran, J.M., Buckleton, J. and Roux, C., 2014. Geographical variation of shoeprint comparison class correspondences. Science & Justice, 54(5), pp.335-337.
613. Beschorner, K., Singh, G., 2012. A novel method for evaluating the effectiveness of shoe-tread designs relevant to slip and fall accidents. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 56(1), pp.2388-2392.

614. Bessman, C.W., Schmeiser, A. Survey of Tire Tread Design and Tire Size as Mounted on Vehicles in Central Iowa, Journal of Forensic Identification, 51(6), 2001, 587-596
615. Birkett, J. “Variations in Adidas ‘Kick’ and Related Soles” MPFSL Report #34, Metropolitan Police Forensic Science Laboratory, June 1983.
616. Bodziak, W, Hammer, L., Johnson, G. M. and Schenck, R. Determining the Significance of Outsole Wear Characteristics During the Forensic Examination of Footwear Impression Evidence. Journal of Forensic Identification, 62 (3), pp. 254-278. May/June 2012.
617. Bodziak, W. J. (2000). Footwear impression evidence: Detection, recovery and examination, 2nd edition. Awareness, detection, and treatment of footwear impression evidence (pp. 7-24). Boca Raton, FL: CRC Press.
618. Bodziak, W. J. (2008). Tire tread and tire track evidence: Recovery and forensic examination. Documenting and recovering tire impression evidence (pp. 45-48). Boca Raton, FL: CRC Press.
619. Bodziak, W. J., “Evidence Photography of Shoe and Tire Impressions,” The Professional Photographer, 43-44, September, 1985.
620. Bodziak, W. J., “Use of Leuco Crystal Violet to Enhance Shoe Prints in Blood,” Forensic Science International 82 (1) 1-5, 1996 Forensic Science International 82 (1) 4552, 1996.
621. Bodziak, W. J., Manufacturing Processes for Athletic Shoe Outsoles and Their Significance in the Examination of Footwear Impression Evidence,” Journal of Forensic Sciences, Vol. 31 No. 1 pp 153-176, 1986.
622. Bodziak, W.J. Footwear Impression Evidence Detection , Recovery and Examination 2nd Edition, CRC Press, 2000
623. Bodziak, W.J., 2012. Traditional conclusions in footwear examinations versus the use of the Bayesian approach and likelihood ratio: a review of a recent UK appellate court decision. Law, Probability and Risk, p.mgs018.
624. Bodziak, W.J., Hammer, L., Johnson, G.M. and Schenck, R., 2012. Determining the Significance of Outsole Wear Characteristics During the Forensic Examination of Footwear Impression Evidence. Journal of Forensic Identification, 254(62), p.3.
625. Bodziak, William J. (2008) Tire Tread and Tire Track Evidence Recovery and Forensic Examination, 270-286
626. Bodziak, William J., Footwear Impression Evidence: Detection, Recovery, and Examination, 2nd edition, Chapter 10, Class and Identifying Characteristics, pp. 329-356, CRC Press, Boca Raton, Florida, 2000
627. Bodziak, William J., Manufacturing Processes for Athletic Shoe Outsoles and Their Significance in the Examination of Footwear Impression Evidence, Journal of Forensic Sciences, 31(1), 153-176
628. Bodziak, William J., Tire Tread and Tire Track Evidence: Recovery and Forensic Examination, Chapter 9, Individual Characteristics, pp. 209-221, CRC Press, Boca Raton, Florida, 2008
629. Bolhouse R.J., and Nause, L.A., (1990) Tires and computers, R.C.M.P. Gazette (Cand.), 52:1, 1 - 11.
630. Bolhouse, R.J. (1984) The identification of vehicles from wheelbase and tire stance measurements. Identification News, 34 (6), 5-6
631. Brennan, J. S., “Dental Stones for Casting Depressed Shoemarks and Tyremarks,” Journal of the Forensic Science Society, 23; 275-286, 1983.
632. Buck, U., Albertini, N., Naether, S., & Thali, M. J. (2007). 3D documentation of footwear impressions and tyre tracks in snow with high resolution optical surface scanning. Forensic Science International. Vol. 171(2-3), pp. 157-164.
633. Cassidy, M. (1995). Footwear Identification. Published by Lightning Powder Company, Inc. in cooperation with the Royal Canadian Mounted Police. ISBN 0-9622305-8-8, pp. 1-176.
634. Cassidy, M. J. (1980). Footwear identification. Identification of footwear evidence (pp. 98-108). Quebec, Canada: Canadian Government Printing Centre.

635. Cassidy, Michael J., Footwear Identification Government of Canada Press, 1987
636. Champod, C., Voisard, R., Girod, A., (2000) A statistical study of air bubbles on athletic shoesoles, Forensic Science International, 109, 105-123
637. Chase, M. T., "The making of the vibram sole: Quabaug's manufacturing process" presented at the International Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence" FBI Academy, Quantico, VA, June 27-July 1, 1994.
638. Chemical enhancement of footwear impressions in blood deposited on fabric — Evaluating the use of alginate casting materials followed by chemical enhancement Kevin J. Farrugia, Niamh NicDaéid, Kathleen A. Savage, Helen Bandey Science & Justice: Journal of the Forensic Science Society, 15 July 2010
639. Chen, J., Donovan, J.A., "The Relation of Schallamach Pattern to Rubber Properties and Wear Conditions," Rubber World 211 (2) 23-27, 1994.
640. Cohen, A., Wiesner, S., Grafit, A., Shor, Y., 2011. A new method for casting three-dimensional shoeprints and tire marks with dental stone. Journal of Forensic Science, 56 (Suppl 1), pp.S210-213.
641. Collaborative Testing Services Inc., CTS Statement on the Use of Proficiency Testing Data for Error rate Determination, March 30, 2010, www.collaborativetesting.com.
642. Committee on Identifying the Needs of the Forensic Sciences Community, 2009, "Strengthening Forensic Science in the United States – A Path Forward," National Research Council, p. 146
643. Cooke, C. W., "Footprints and Tiretracks," Identification News 31 (7): 7-10, 1981.
644. Cooke, C. W., A Practical Guide to the Basics of Physical Evidence, Springfield, Illinois, Charles C. Thomas: 101-136, 1984.
645. Croft, S, NicDaeid, N., Savage, K. A., Vallance, R., and Ramage, R. The Enhancement and Recovery of Footwear Marks Contaminated in Soil: A Feasibility Study. J. Forensic Ident. 2010; 60 (6): 718-737.
646. Cullen, S., Otto, A., and Cheetham, D. M. Chemical Enhancement of Bloody Footwear Impressions from Buried Substrates. J. Forensic Ident. 2010; 60 (1): 45-86.
647. Dardi, F., Cervelli, F. and Carrato, S., 2009, September. An automatic footwear retrieval system for shoe marks from real crime scenes. In Image and Signal Processing and Analysis, 2009. ISPA 2009. Proceedings of 6th International Symposium on (pp. 668-672). IEEE.
648. David, R. (1981). An intelligence approach to footwear and toolmarks. Journal of the Forensic Science Society, 21, 183–193.
649. Davis, R. and Keeley, A. "Feather of Footwear," Proceedings Science & Justice 2000; 40 (4); 273-276.
650. Davis, R. J. and DeHaan, J.D., "A Survey of Men's Footwear," Journal of the Forensic Science Society, 17 (4): 271-285, 1977.
651. Davis, R. J., "The enhancement of Two-dimensional footwear impressions using electrostatic lifting, ESDA and gel lifting" presented at the International Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence" FBI Academy, Quantico, VA, June 27-July 1, 1994.
652. Davis, R. J., "UK trends in the examination of footwear impression evidence" presented at the International Symposium on the Forensic aspects of Footwear and Tire Impression Evidence, FBI Academy, Quantico, VA, June 27-July 1, 1994.
653. Davis, R.J and Keeley, A. Feathering of Footwear, Science and Justice, 40(4), 2000, 273-276.
654. DeHaan, J. D., "Wear Characteristics of Men's Footwear," presented at International Association of Forensic Science meeting, Vancouver, B.C., August, 1987.
655. DeHann, J. D., "Footwear Evidence: An Update" 1982, (unpublished).
656. Deskiewicz, Kevin J., "Schallamach Pattern on Shoe Outsole Acknowledged by Court in Footwear Identification," Journal of Forensic Identification, 50 (1) 1-4, 2000.
657. Drillis, R. J. (1958). Objective recording and biomechanics of pathological gait. Annals of the New York Academy of Sciences, 74, 86-109.

658. Evett, IW, Lambert, JA, Buckleton, JS, A Bayesian approach to interpreting footwear marks in forensic casework, Science & Justice , 1998, 38, 241-247
659. Farrugia, K. J., Bandey, H., Dawson, L. & Nic Daéid, N. Chemical enhancement of soil based footwear impressions on fabric. Forensic Science International. Available online December 6, 2011
660. Farrugia, K. J., Riches, P., Bandey, H., Savage, K. & NicDaéid, N. Controlling the variable of pressure in the production of test footwear impressions. Science & Justice. Available online December 22, 2011
661. Farrugia, K., Bandey, H., Dawson, L. & Nic Daéid, N. A Comparison of Enhancement Techniques for Footwear Impressions on Dark and Patterned Fabrics. Journal of Forensic Sciences 58(6), pp. 1472–1485. November 2013.
662. Farrugia, K.J., NicDaéid, N., Savage, K.A. and Bandey, H., 2010. Chemical enhancement of footwear impressions in blood deposited on fabric—evaluating the use of alginate casting materials followed by chemical enhancement. Science & Justice, 50(4), pp.200-204.
663. Fruchtenicht , T.L., Herzig, W.P., 2 & Blackledge, R.D. (2002). The discrimination of two-dimensional military boot impressions based on wear patterns. Science & Justice, 42 (2), 97-104.
664. Gamage, R.E., Joshi, A., Zheng, J.Y. and Tuceryan, M., 2013. A high resolution 3D tire and footprint impression acquisition for forensics applications. Applications of Computer Vision, 2013 IEEE Workshop pp. 317-322.
665. Gao, B. and Allinson, N.M., 2009. A novel model-based approach for 3D footwear outsole feature extraction. In Image and Signal Processing and Analysis, Proceedings of 6th International Symposium pp. 673-677.
666. Geradts, Z. & Keijzer, J. (1996). The image-database REBEZO for shoeprints with developments on automatic classification of shoe outsole designs. Forensic Science International, 82(1), 21-31.
667. Geradts, Z., Keijzer, J. (1996) The image-database REBEZO for shoeprints with developments on automatic classification of shoe outsole designs, Forensic Science International, Volume 82, Issue 1, 21-31
668. Girod, A., (1996) Computerized classification of the shoeprints of burglar's soles. Forensic Sci. Intl., 82(1)
669. Gorsuch, L., "Distortion in the class characteristics of footwear impression made in water-saturated soils" presented at the International Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence" FBI Academy, Quantico, VA, June 27-July 1, 1994.
670. Graham Jackson of AdvanceForensicScience.com and co-author of Evidence Evaluation: A Response to the Court of Appeal Judgment in R v T (Science & Justice, 2011) provided SWGTREAD with some additional references related to the R v T decision regarding the admissibility of footwear impression evidence in court. Refer to the following cites for more peer-reviewed and published information on this decision:
671. Groom, P. S. and Lawton, M.E., "Are They A Pair?," Journal of the Forensic Science Society, 27: 189-192, 1987.
672. Gross, S., Jeppesen, D., Neumann, C., 2013. The Variability and Significance of Class Characteristics in Footwear Impressions. Journal of Forensic Identification, 63(3), pp.332-351.
673. Gueissaz, L., Massonnet, G., 2013. Tire Traces – discrimination and classification of pyrolysis-GC/MS profiles. Forensic Science International, 230(1-3) 46-57.
674. Gueissaz, L., Massonnet, G., 2014. Chemical analysis of tire traces in traffic accidents investigation. Journal, of Forensic Science and Medicine.
675. H. Majamaa, & A. Ytti. A Survey of the Conclusions Drawn of Similar Footwear Cases in Various Crime Laboratories. Forensic Science International. Vol. 82, No. 1 (1996). pp. 109-120.
676. Hall, B. R., Nolan, A. M., "An Improved Technique to Enable 2-Dimensional Shoe Sole Impression Evidence to be Photographically Recorded 'To Scale', " Journal of Forensic Sciences Vol. 39 No. 4 pp 1094-1099, 1994.

677. Hamburg, C. & Banks, R. (2010, August). Evaluation of the random nature of acquired marks on footwear outsoles. Presentation conducted at the Impression and Pattern Evidence Symposium, Clearwater Beach, FL.
678. Hamer, P. and Price, C., "Case Report: A Transfer From Skin To Clothing By Kicking – The Detection and Enhancement of Shoeprints," Journal of the Forensic Science Society, 33 (3): 169-172, 1993.
679. Hamiel, J., Yoshida, J., 2012. Evaluation and application of polynomial texture mapping (PTM) in the area of shoe/tire impression evidence. Department of Justice.
680. Hamilton, D., "Traces of Footwear, Tyres and Tools, etc., in Criminal Investigation," The Police Journal, 22: January-March, 42-49 and April –June, 128-137, 1949.
681. Hamm, E. D., "The Individuality of Class Characteristics in Converse All-Star Footwear," Journal of Forensic Identification 39 (5) 1989, 277-292.
682. Hamm, E. D., "Tire Tracks and Footwear Identification," Identification News, 3-6 January, 1975.
683. Hamm, E.D., 2015. Tire tracks and footwear identification. (Publication unkowns).
684. Hammer, L., Duffy, K., Fraser, J. and Daéid, N.N., 2013. A Study of the Variability in Footwear Impression Comparison Conclusions. Journal of Forensic Identification, 63(2), p.205.
685. Hammer, L., Nic Daeid, N., Kennedy, R. & Yamashita A. B. Preliminary Study of the Comparison of Inked Barefoot Impressions with Impressions from Shoe Insoles Using a Controlled Population. Journal of Forensic Sciences, 62(6), pp. 603-–622. 15 Nov/Dec 2011.
686. Hancock, S., Morgan-Smith, R. and Buckleton, J. 2012. The interpretation of shoeprint comparison class correspondences. Science & Justice, 52(4), pp.243-248.
687. Hannigan, T.J., Fleury, L.M., Reilly, R.B., O'Mullane, B.A., deChazal P. (2006) Survey of 1276 shoeprint impressions and development of an automatic shoeprint pattern matching facility Science & Justice, Volume 46, Issue 2, 79-89
688. Hara, T. Qualitative Evaluation of the Distinguishing Characteristics in Footprints Identification and Their Evidential Values. Japanese Journal of Science and Technology for Identification, Vol. 9 (2004), No. 1, pp. 59-63.
689. Hayes, A. J., "Factors that influence wear on shoes" presented at the International Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence" FBI Academy, Quantico, VA June 27-July 1, 1994
690. Hilderbrand, D. (1999). Four Basic Components of a Successful Footwear Examination. Journal of Forensic Identification. 49(1), pp. 37-59.
691. Hire, V.R., Shaikh, F.I., Jadhav, J.B. and Joshi, M.V., 2012. A Novel Automated Shoeprint Matching Technique for use as Forensic Evidence in Criminal Investigation. International Journal of Computer Applications, 48(4).
692. Hueske, Edward E., "A Superior Method for Obtaining Test Prints from Footwear and Tires," Journal of Forensic Identification, 41 (3): 165-167, 1991.
693. Hueske, Edward E., "Photographing and Casting Footwear/Tire Track Impressions in Snow," Journal of Forensic Identification, 41(2): 92-95, 1991.
694. I. Benedict, et al., Geographical variation of shoeprint comparison class correspondences, Sci. Justice (2014).
695. Izraeli, E. S., Wiesner, S. & Shor, Y. Computer-Aided Courtroom Presentation of Shoeprint Comparison. J. Forensic Ident. 2011; 61 (6): 549-559.
696. J. Skerrett, et al., A Bayesian approach for interpreting shoemark evidence in forensic casework: Accounting for wear features, Forensic Sci. Int. (2011), doi:10.1016/j.forsciint.2011.01.030
697. Jay, C.B. and Grub, M.J. Defects in Polyurethane-soled Athletic Shoes – Their Importance to the Shoeprint Examiner, Journal of the Forensic Science Society, 25: 233-238
698. Jing, M.Q., Ho, W., and Chen, L.H., 2009. A novel method for shoeprints recognition and classification. International Conference on Machine Learning and Cybernetics, pp. 2846-2851.

699. Johnson G.M. Letter to the Editor Re: New Method for Examining the Inside of Footwear. J. Forensic Ident. 2009; 59 (1): 2-4.
700. Jurgens, E., Hainey, A., Shaw, L., and Andries, J. Chemical Enhancement of Footwear Impressions in Blood Recovered from Cotton using Alginate Casts. Journal of Forensic Identification, 65(3), pp. 247-272. May/June 2015.
701. Kadam, A.B., Manza, R.R., Kale, K.V., 2012. A Review: Analysis of footwear impression evidence collection and detection. International Journal of Medicine Intelligence, 4(2), pp.410-413.
702. Kainuma, A. Manufacturing Variations in a Die-Cut Footwear Model, Journal of Forensic Identification, 55(4), 2005, 503-517
703. Katterwe, H., "Current usage of footwear and tire tread evidence in Germany" presented at the International Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence" FBI Academy, Quantico, VA, June 27-July 1, 1994
704. Keijzer, J. Identification Value of Imperfections in Shoe with Polyurethane Soles in Comparative Shoeprint Examination, Journal of Forensic Identification, 40(4), 1990, 217-223
705. Keijzer, J.; Geradts, Z. ; Keereweer, I. (1995) Nationwide Classification System for Shoe Outsoles Designs Journal of Forensic Identification, Volume: 45 Issue:1, 30-37
706. Kennedy, R. B., Pressmann I. S., Chen S., Petersen P.H., Pressman A.E., Statistical analysis of barefoot impressions, J Forensic Sci. 2003;48(1):55–63.
707. Kennedy, R.B., Chen, S., Pressmann, I.S., Yamashita, A.B., Pressman, A.E., A large-scale statistical analysis of barefoot impressions, J Forensic Sci. 2005;50(5):1071–9.
708. Kerstholt J.H., Paashuis R., Sjerps, M. Shoe print examinations: Effects of expectation, complexity and experience, Forensic Science International, 165, 2006.
709. Kevin J. Farrugia, Helen Bandey, Steve Bleay and Niamh NicDaéid. Chemical enhancement of footwear impressions in urine on fabric. Forensic Science International. Available online 2 August 2011.
710. Kevin J. Farrugia, Kathleen A. Savage, Helen Bandey and Niamh Nic Daéid. Chemical Enhancement of Footwear Impressions in Blood on Fabric - Part 3: Amino Acid Staining. Science & Justice. Available online September 13, 2012.
711. Kevin J. Farrugia, Kathleen A. Savage, Helen Bandey and Niamh Nic Daéid. Chemical Enhancement of Footwear Impressions in Blood on Fabric - Part 1: Protein Stains. Science & Justice. Available online February 5, 2011.
712. Kevin J. Farrugia, Kathleen A. Savage, Helen Bandey, Tomasz Ciuksza and Niamh Nic Daéid. Chemical Enhancement of Footwear Impressions in Blood on Fabric - Part 2: Peroxidase Reagents. Science & Justice. Available online February 8, 2011.
713. Kirk, Paul L., Crime Investigation, 2 ed., New York, NY: John Wiley and Sons, Chapter 7, 22, and 23.
714. Koehler, J.J., 2011. If the shoe fits they might acquit: the value of forensic science testimony. Journal of Empirical Legal Studies, 8(s1), pp.21-48.
715. Komar, D. A., Davy-Jow, S. & Decker, S. J. The Use of a 3-D Laser Scanner to Document Ephemeral Evidence at Crime Scenes and Postmortem Examinations. Journal of Forensic Sciences, 57 (1), pp. 188–191. January 2012.
716. L.S. Nause, Forensic Tire Impression Identification, 2001, Canadian Police Research Centre, pg. 223
717. Lachowicz, T., Sieba-Palus, J., Koscielniak, P., 2013. Chromatographic Analysis of Tire Rubber Samples as the Basis of Their Differentiation and Classification for Forensic Purposes. Analytical Letter, 46(15) pp.2332-2344.
718. Lachowicz, T., Zieba-Palus, J., Koscielniak, P., 2014. Pyrolysis Gas Chromatogrphy-Mass spectrometry for the characterization of tire marks for forensic analysis. Analytical Letter, 47(7), pp.1107-1117.
719. Lai, M.-Y. & Wang, L.-L. (2008). Automatic shoe-pattern boundary extraction by image-processing techniques. Robotics and Computer-Integrated Manufacturing, 24, 217-227.

720. Lelievre, M. Footwear Identification: Let's take a step back and move forward. Identification Canada, 35 (4), pp. 124-137. December 2012.
721. LeMay J. Making Three-Dimensional Footwear Test Impressions with "Bubber". J. Forensic Ident. 2010; 60 (4): 439-448.
722. LeMay, J. Accidental Characteristics in a Footwear Outsole Caused by Incomplete Blending of Fillers in the Outsole Rubber. Journal of Forensic Identification, 63(5), pp. 525-530. September/October 2013.
723. LeMay, J. If the Shoe Fits: An Illustration of the Relevance of Footwear Impression Evidence and Comparisons. J. Forensic Ident. 2010; 60 (3): 352-356.
724. LeMay, J. The Documentation of a Large Outdoor Crime Scene with a Large Number of Footwear Impressions: Their Analysis and Comparison. J. Forensic Ident. 2010; 60 (6): 738-747.
725. Lin, G., Elmes, G., Walnoha, M. and Chen, X., 2009. Developing a Spatial-Temporal Method for the Geographic Investigation of Shoeprint Evidence.Journal of forensic Sciences, 54(1), pp.152-158.
726. Loll, A. Understanding Digital Enhancement Processes. Journal of Forensic Identification, 66(1), pp. 3-12. January/February 2016.
727. Luostarinen, T. and Lehmussola, A., 2014. Measuring the accuracy of automatic shoeprint recognition methods. Journal of forensic sciences, 59(6), pp.1627-1634.
728. M.J. Cassidy, 1980, “Footwear Identification,” Ottawa, Ontario, Canada, Lightning Powder, Co. Inc (reprint).
729. Majamaa, H. & Ytti, A. (1996). Survey of conclusions drawn of similar footwear cases in various crime laboratories. Forensic Science International, 82 (1), 109-120.
730. Majamaa, H. (2000). Footwear databases used in police and forensic laboratories. Information Bulletin for Shoeprint/Toolmark Examiners, 6, 133–157.
731. Maltais, L. & Yamashita, A. B. (2010). A Validation Study of Barefoot Morphology. Journal of Forensic Identification, 60 (3), 362-370.
732. McConaghey, D. Resting Gelatin Lifters Prior to Use. Journal of Forensic Identification, 63(6), pp. 653-659. November/December 2013.
733. McNeil, K., Knaap, W., 2011. Bromophenol Blue as a chemical enhancement technique for latent shoeprints. Journal of Forensic Identification, 62(2), pp.143-153.
734. Mikkonen, S. and Astikainen, T., 1994. Databased classification system for shoe sole patterns—Identification of partial footwear impression found at a scene of crime. Journal of Forensic Science, 39(5), pp.1227-1236.
735. Mikkonen, S., Suominen, V., Heinonen, P. (1996) Use of footwear impressions in crime scene investigations assisted by computerised footwear collection system, Forensic Sci. Intl, Volume 82, Issue 1, 67-79
736. Milne, R. (2001). Operation Bigfoot, a volume crime database project. Science & Justice, 41, 215–217.
737. Milne, R. The Development of a Wireless Electrostatic Mark Lifting Method and its use at Crime Scenes. Journal of Forensic Identification, 62 (2), pp. 154-164. March/April 2012.
738. Morgan-Smith R.K., Elliott D.A., and Adam H. Enhancement of Aged Shoeprints in Blood. J. Forensic Ident. 2009; 59 (1): 45-50.
739. Murray, M. P., Drought, A. B., & Kory, R. C. (1964). Walking patterns of normal men. The Journal of Bone and Joint Surgery, 46 (2), 335-360.
740. Murray, M.P., Kory, C., Clarkson, B. H., & Sepic, S. B. (1966). Comparison of the free and fast speed walking patterns of normal men. American Journal of Physical Medicine & Rehabilitation, 45 (1), 8-24.
741. Music, D. and Bodziak, W. J., “A Forensic Evaluation of the Air Bubbles Present in Polyurethane Shoe Outsoles As Applicable in Footwear Impression Comparisons,” Journal of Forensic Sciences, Vol. 33 No. 5 pp September, 1988.
742. Music, D.K., Bodziak, W.J., Evaluation of the air bubbles present in polyurethane shoe outsoles as applicable in footwear impression comparisons, Journal of Forensic Sciences, 33(5), 1988, 1185-1197

743. Napier, T.J. (2002) Scene linking using footwear mark databases. Science & Justice, 42 (1), 39 - 43.
744. Natarajan, N., Ranjit, G.M., (2005) Computer assisted analysis of footprint geometry, Journal of Forensic Identification, Volume: 55, Issue: 4, 489-498
745. Nause L.A. and Souliere M.P. Recording a Known Tire Impression from a Suspect Vehicle. J. Forensic Ident. 2008; 58 (3): 305-314.
746. Needham, J. A. & Sharp, J. S. (2016). Watch your step! A frustrated total internal reflection approach to forensic footwear imaging. Science Reports, 6, Article number: 21290. doi:10.1038/srep21290.
747. Nisida, T., Suemoto, A. A Study of a Production Characteristic Caused by the Footwear Sole. Japanese Journal of Forensic Science and Technology, Vol. 13 (2008), No. 1, pp. 101-106.
748. Ostrosky, K. M., VanSwearingen, J. M., Burdett, R. G. & Gee, Z. A comparison of gait characteristics in young and old subjects. (1994). Physical Therapy, 74(7), 637-644.
749. Parent, S. The Significance of Class Associations of Footwear Evidence, unpublished, poster presented at the 2010 Impression and Pattern Evidence Symposium, Clearwater Beach, Florida, August 2010.
750. Park, S., Kim, T., Choi, Y., Chae, S. Analysis of Two Tire Marks on the Head and Clothing. Japanese Journal of Forensic Science and Technology, Vol. 11 (2006), No. 1, pp. 125-129.
751. Patil, P.M. and Kulkarni, J.V., 2009. Rotation and intensity invariant shoeprint matching using Gabor transform with application to forensic science. Pattern Recognition, 42(7), pp.1308-1317.
752. Pavlou, M. & Allinson, N. M. (2009). Automated encoding of footwear patterns for fast indexing. Image and Vision Computing, 27(4), 402–409.
753. Petraco N.D.K., Gambino C., Kubic T.A., Olivio D., and Petraco N. Statistical Discrimination of Footwear: A Method for the Comparison of Accidentals on Shoe Outsoles Inspired by Facial Recognition Techniques. J. Forensic Sci. 2010; 55 (1): 34-41.
754. Petraco, N. et al. (2010). Statistical Discrimination of Footwear: A Method for the Comparison of Accidentals on Shoe Outsoles Inspired by Facial Recognition Techniques. Journal of Forensic Sciences, 55(1), pp. 34-41.
755. Petraco, N., "A Rapid Method for the Preparation of Transparent Footwear Test Prints," Journal of Forensic Sciences, Vol. 27 No. 4 pp 935-937, 1982.
756. Petraco, N.D., Gambino, C., Kubic, T.A., Olivio, D. and Petraco, N., 2010. Statistical discrimination of footwear: a method for the comparison of accidentals on shoe outsoles inspired by facial recognition techniques. Journal of forensic sciences, 55(1), pp.34-41.
757. Pierce D. Edge Characteristics of Footwear. Ident. Canada. 2009; 32 (1): 4-22.
758. Pircher, R., Epting, T., Schmidt, U., Geisenberger, D., Pollak, S., Kramer, L., 2015. Skin blister formation together with patterned intradermal hematoma: a special type of tire mark injury in victims run over by a wheel. Forensic Science International, 249, pp.42-46.
759. Potter, D. R. "Two types of outsole manufacturing techniques and their influence on footwear impression variation" presented at the International Symposium on the Forensic Aspects of Footwear and Tire Impression Evidence" FBI Laboratory, Quantico, VA, June 227-July 1, 1994.
760. Rankin, B., "Etudes (4)-Footwear Marks-A Step by Step Review" Interfaces, No.14 April/June 1998.
761. Rathinavel, S. and Arumugam, S., 2011. Full Shoe Print Recognition based on Pass Band DCT and Partial Shoe Print Identification using Overlapped Block Method for Degraded Images. International Journal of Computer Applications, 26(8), pp.16-21.
762. Raymond, J., Sheldon, P., 2015. Standardizing shoemark evidence – An Asutralian and New Zealand collaborative trail. Journal of Forensic Identification, 65(5), pp.868-833.
763. Robin Bowen; Jessica Schneider (2007) Forensic Databases: Paint, Shoe Prints, and Beyond. National Institute of Justice Journal Issue: 58, 34-38
764. Saxena, A., Khosla, N., Venkataraman, V., 2013. Building an image-based shoe recommendation system. Stanford University.

765. Schiffer B., Champod C., The potential (negative) influence of observational biases at the analysis stage of fingermark individualization. Forensic Sci Int, 167, 2007.
766. Sheets, H.D., Gross, S., Langenburg, G., Bush, P.J. and Bush, M.A., 2013. Shape measurement tools in footwear analysis: A statistical investigation of accidental characteristics over time. Forensic science international, 232(1), pp.84-91.
767. Shor, Y. & Weisner, S. (1999). A survey on the conclusions drawn on the same footwear marks obtained in actual cases by several experts throughout the world. Journal of Forensic Sciences, 44 (2), 380-384.
768. Shor, Y., Cohen, A., Wiesner, S., Weiss, R., 2014. Recovering dusty shoe prints from skin: comparative research. The Open Forensic Science Journal, 7, pp.1-5.
769. Skerrett, J., Neumann, C. and Mateos-Garcia, I., 2011. A Bayesian approach for interpreting shoemark evidence in forensic casework: Accounting for wear features. Forensic science international, 210(1), pp.26-30.
770. Smith, M.B. *The Forensic Analysis of Footwear Impression Evidence*. www.fbi.gov/about-us/lab/forensic-science-communications/fsc/july2009/review/2009_07_review02.htm
771. Smith, R., Tang, T., Johnson, D., Ledbury, E., Goddette, T., Felicelli, S., 2012. Simulation of thermal signature of tires and tracks. Defense Technical Information Center, 20.
772. Snyder, C. The Ability of Footwear to Produce Impressions of Good Detail in Sandy Soil Substrates. Journal of Forensic Identification, 65(3), pp. 273-288. May/June 2015.
773. Snyder, C. A Comparison of Photography and Casting Methods of Footwear Impressions in Different Sandy Soil Substrates. Journal of Forensic Identification, 66(1), pp. 37-58. January/February 2016.
774. Speller,H. C., “The Identification of Crepe Rubber Sole Impressions,” The Police Journal, 22: 269-274, 1949.
775. Stone, R. (2006). Footwear Examinations: Mathematical Probabilities of Theoretical Individual Characteristics. Journal of Forensic Identification. 56(4), pp. 577-599.
776. Stone, R. S., “Mathematical Probabilities in Footwear Comparisons,” Presented at the FBI Technical Conference on Footwear and Tire Impression Evidence, Quantico, VA, April 1994.
777. Stone, R.S., 2015. Footwear Examinations: Mathematical Probabilities of Theoretical Individual Characteristics. Journal of Forensic Identification, 65(4), p.671.
778. T.J. Hannigan, L.M. Fleury, R.B. Reilly, B.A. O’Mullane and P. deChazal. Survey of 1276 Shoeprint Impressions and Development of an Automatic Shoeprint Pattern Matching Facility. Science & Justice. 2006; 46 (2): 79-89.
779. T.J. Napier (2002) Scene linking using footwear mark databases Science & Justice, Vol 42, Issue 1,39-43
780. Tang, Y., Kasiviswanathan, H., & Srihari, S. An efficient clustering-based retrieval framework for real crime scene footwear marks. International Journal of Granular Computing, Rough Sets and Intelligent Systems, 2012 Vol.2, No.4, pp. 327-360.
781. Tang, Y., Srihari, S. N., & Kasiviswanathan, H. (2010). Similarity and Clustering of Footwear Prints," grc, pp.459-464, 2010 IEEE International Conference on Granular Computing, 2010
782. Tart, M.S., Downey, A.J, Goodyear, J.G., Adams, J. The Appearance of Feathering as a Feature of Wear, The Forensic Science Service, (FSS Report No. RR 786) 1-11
783. Tryhorn, F. G., “Scientific Aids in Criminal Investigation, Part V, Marks and Impressions” Police Journal (London) 10: 19-27, 1937.
784. Tuceryan, M., Zheng, J., 2013. Digitizing device to capture track impression. Department of Justice
785. W.J. Bodziak. 1999. Footwear Impression Evidence–Detection, Recovery, and Examination,. Boca Raton, FL: CRC Press, 2nd ed., p. 329.
786. Wei, C.H., Li, Y. and Gwo, C.Y., 2013. The Use of Scale-Invariance Feature Transform Approach to Recognize and Retrieve Incomplete Shoeprints. Journal of forensic sciences, 58(3), pp.625-630.

787. Whittle, M. W. (1996). Gait analysis: An introduction, Second edition. Oxford, England: Butterworth-Heinemann.
788. Wiesner, S., Izraeli, E., Shor, Y. and Domb, A., 2013. Lifting bloody footwear impressions using alginate casts followed by chemical enhancement. Journal of forensic Sciences, 58(3), pp.782-788.
789. Wiesner, S., Tsach, T., Belser, C. and Shor, Y., 2011. A comparative research of two lifting methods: electrostatic lifter and gelatin lifter. Journal of forensic sciences, 56(s1).
790. Wilson, H. (2012). Comparison of the Individual Characteristics in the Outsoles of Thirty-Nine Pairs of Adidas Supernova Classic Shoes. Journal of Forensic Identification. 62(3), pp. 194-203.
791. Wisbey D. Counterfeit Nike Sneakers. J. Forensic Ident. 2010; 60 (3): 337-351.
792. Wyatt, J. M., Duncan, K., Trimpe, M. A. (2005). Aging of shoes and its effect on shoeprint impressions. Journal of Forensic Identification, 55(2), 181-188.
793. Zmuda, C.W. Identification of Crepe-Sole Shoes, Journal of Criminology, Criminal Law and Police Science, 44 (3): 374-378

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794. ABFO Bitemark Methodology Standards and Guidelines, abfo.org/wp-content/uploads/2016/03/ABFO-Bitemark-Standards-03162016.pdf
795. ABFO Inc. JADA; 112:383-6 Guidelines for bitemark analysis. 1986
796. Aboshi H, Taylor JA, Takei T, Brown KA. J Forensic Odont; 12(2):41-4 Comparison of bitemarks in foodstuffs by computer imaging: a case report. 1994
797. Adam Freeman and Iain Pretty "Construct validity of Bitemark assessments using the ABFO decision tree," presentation at the 2016 Annual Meeting of the American Academy of Forensic Sciences. See: online.wsj.com/public/resources/documents/ConstructValidBMdecisiontreePRETTYFREEMAN.pdf.
798. Adams, BJ; 2003 - The Diversity of Adult Dental Patterns in the United States and the Implications for Personal Identification. J For Sci, 48(3):497-503.
799. Affidavit of Charles Michael Bowers, D.D.S., J.D. Eddie Howard, Petitioner, v. The State of Mississippi, Respondent.
800. Afsin, H., Buyuk, Y., Sadi Cagdir, A., 2013. Difficulties encountered in bite mark analysis. Journal of Forensic Odontostomatol, 31(suppl 1), pp.133.
801. Aggarwal, A., Panat, S., Sapra, G., 2011. Human bitemarks: an update. Indian Journal of Forensic Medicine and Toxicology, 28(2), pp.60-63.
802. Aitken C, MacDonald DG. An application of discrete kernel methods to forensic odontology. Applied Statistics, 28:1;55-61. 1979
803. Aksu MN, Gobetti JP. Am J Forensic Med Pathol; 17(2):136-40 1996 The past and present legal weight of bite marks as evidence.
804. Akutsu T, Watanabe K, Fujinami Y, Sakurada K; 2010 - Applicability of ELISA detection of statherin for forensic identification of saliva, International J Legal Med, 124(5):493-8
805. Allison, RT, Whittaker, DK; 1990 – Use of benzidine for histological demonstration of haemoglobin in human bite marks, J Clin Pathol, 43: 600-603
806. Al-Talabani N, Al-Moussawy ND, Baker FA, Mohammed HA, 2006. Digital analysis of experimental human bitemarks: Application of two new methods. Journal of Forensic Sciences 51 (6): 1372-1375.
807. Anderson WR, Hudson RP. Forens Sci; 7(1):71-4 Self inflicted bitemarks in battered child syndrome. 1976
808. Antony, P.J., Pillai, K.S., George, G.B., Varghese, T., Puthalath, M.S., Arakkal, L.J., 2015. Applicability of Berry's index in bite mark analysis. Journal of Forensic Dental Sciences, 7(1), pp.28-31.
809. Anzai-Kanto E, Hirata MH, Hirata RD, Nunes FD, Melani RF, Oliveira RN; 2005 –DNA extraction from human saliva deposited on skin and its use in forensic identification procedures, Braz Oral Re, 19(3):216-22.

810. Arheart, K. L. and I. A. Pretty (2001). "Results of the 4th ABFO Bitemark Workshop- 1999." Forensic Science International 124(2-3): 104-111.
811. Arheart, K.L., and I.A. Pretty. "Results of the 4th AFBO Bitemark Workshop-1999." *Forensic Science International*, Vol. 124, No. 2-3 (2001): 104-11.
812. Ata-Ali, J., Ata-Ali, F., 2014. Forensic dentistry in human identification: A review of the literature. Journal of Clinical and Experimental Dentistry, 6(2), pp.e162-e167.
813. Atkinson SA. Med, Sci & Law; 38(1):34-41 1998 A qualitative and quantitative survey of forensic odontologists in England and Wales.
814. Atsu SS, Gokdemi K, Kedici PD, Ikyaz YY; 1998 - Bitemarks in Forensic Odontology, J Forensic Odonto, 16(2): 30-34.
815. Avon, S.L., Victor, C., Mayhall, J.T., Wood, R.E., 2010. Error rates in bite mark analysis in an in vivo animal model. Forensic Science International, 201(1-3), pp.45-55.
816. Bachem A , Reed CI; The Penetration of Light Through Human Skin. Publication of The University of Illinois, College of Medicine, Chicago.
817. Bang G. Acta Odontol Scand; 34(1):1-11 Analysis of tooth marks in a homicide case. 1976
818. Barbanel JC, Evans JH. J Forensic Sci Soc; 14(3):235-8 1974 Bitemarks in skin – mechanical factors.
819. Barbanel JC, Evans JH; 1974 - Bitemarks in skin - mechanical factors, J Forensic Sci Soc, 14(3):235-8.
820. Barry LA Bull Hist Dent; 42(1):21-7 Bite mark evidence collection in the United States. 1994
821. Barsley RE, West MH, Fair JA. Am J Forensic Med Pathol; 11(4):300-8 Forensic photography. Ultraviolet imaging of wounds on skin. 1990
822. Barsley RE, West MH, Fair JA; 1990 - Forensic photography - Ultraviolet imaging of wounds on skin, Am J Forensic Med Pathol, 11(4):300-8.
823. Barsley, R., Freeman, A., Matcalf, R., Senn, D., Wright, F., 2012. Bitemark analysis. Journal of the American Dental Association, 143(5) pp.444.
824. Barsley, RE, Lancaster, DM; 1987 - Measurement of arch widths in a human population: relation of anticipated bite marks. J For Sci, 32(4):975-982.
825. Beckstead JW, Rawson RD, Giles W. JADA; 99(1):69-74 Review of bite mark evidence. 1979
826. Beena, V.T., Gopinath, D., Heera, R., Rajeev, R., Sivakumar, R, 2012. Bite marks from the crime scene - an overview. Oral & Maxillofacial Pathology Journal, 3(1).
827. Benson, B. W., J. A. Cottone, et al. (1988). "Bite Mark Impressions - a Review of Techniques and Materials." Journal of Forensic Sciences 33(5): 1238-1243.
828. Bernitz H, Van Heerden WFP, Solheim T, and J.H. Owen. 2006. A technique to capture, analyze, and quantify anterior teeth rotations for application in court cases involving tooth marks. Journal of Forensic Sciences 52:624-629.
829. Bernitz, O, Heerden, J, van Willie, FP, Solheim, T; 2008 - An Integrated Technique for the Analysis of Skin Bite Marks; J Forensic Sci, 53(1):194-198.
830. Bernstein ML. J Forens Sci; 30(3):958-64 Two bitemark cases with inadequate scale references. 1985
831. Bernstein, M. L. (1986). "Testing the Bite Mark." Journal of the American Dental Association 112(6): 806-806.
832. Bernstein, ML; 2005 - Nature of Bitemarks, Bitemark Evidence, Chapter 5, 74-75.
833. Bhargava, K., Deepak, B., Rastogi, P., Paul, M., Paul, R., Jagadeesh, H.G., Singla, A., 2012. An overview of bite mark analysis. Journal of Indian Academy of Forensic Medicine, 34(1), pp.61-66.
834. Bitemark Evidence, Second Edition, 2011 - edited by Dorion, RBJ. CRC Press:Boca Raton, FL (Dorion, Bitemarks, 2000.
835. Blackwell SA et al; 2007 - 3-D imaging and quantitative comparison of human dentitions and simulated bitemarks, Int J Leg Med, 121:9-17.

836. Blackwell SA, Taylor RV, Gord on I, Ogleby CL, Tanjiri T, Yoshino M, Donald MR, Clement JG; 2005 - 3-D imaging and quantitative comparison of human dentitions and simulated bite marks, International J Legal Med, October 2005.
837. Bowers CM, Johansen RJ. Digital Analysis of Bitemark Evidence. Santa Barbara. CA: Forensic Imaging Services 2000
838. Bowers CM, Pretty IA; 2009 - Expert Disagreement in Bitemark Casework, J Forensic Sci, 54(4):915-18.
839. Bowers CM. For sci Int 159S 2006 S104- S109. Problem-based analysis of bitemark misidentifications: the role of DNA.
840. Bowers, C. M. and R. J. Johansen (2002). "Photographic evidence protocol: The use of digital imaging methods to rectify angular distortion and create life size reproductions of bite mark evidence." Journal of Forensic Sciences 47(1): 178-185
841. Bowers, C.M., 2011. Bitemark analysis. Journal of the American Dental Association, 142(12), pp.1334-1335.
842. Bowers, CM 2004 - "Recognition, Recovery, and Analysis of Bite Mark Evidence" Chapter 3; Forensic Dental Evidence Elsevier
843. Bowers, CM, Bell, GL; 1995 - ABFO Guidelines and Standards, Manual of Forensic Odontology (Third Edition), Chapter 11, 339-341.
844. Bowers, CM; 2006 – Problem-based analysis of bitemark misidentifications: The role of DNA. Forensic Science International, 159:S104-S109.
845. Bowers, M.C., 2002. Identification from Bitemarks: Proficiency Testing of Board Certified Odontologists. in Modern Scientific Evidence: The Law and Science of Expert Testimony, eds. Faigman, David L. et al.
846. Broder B, Jerrard, D, Olshaker, J, Witting, J; 2004 - Low risk of infection in selected human bites treated without antibiotics; Amer J Emergency Medicine, 22(1):10-13.
847. Brouwer, IG; 2008 - Medical legal Importance of the correct Interpretation of traumatic skin injuries, Continuing Medical Education
848. Brown KA, Elliot TR, Rogers AH, Thonard JC: 1984 - The survival of oral streptococci on human skin and its implication in bitemark investigation, Forensic Sci Int, 26(3):193-7
849. Bush et al., 2010 - The Response of Skin to Applied Stress: Investigation of Bitemark Distortion in A Cadaver Model, J Forensic Sci, 55(1).
850. Bush MA, Bush PJ, Sheets D; 2011 – A Study of Multiple Bitemarks inflicted in human skin by a single dentition using geometric morphometric analysis, DOI: 10.1616/j.forsciint.2011.03.028, Forensic Sci International 211(1-3):1-8.
851. Bush MA, Bush PJ, Sheets HD; 2011 - Similarity and Match Rates of the Human Dentition in 3-Dimensions: Relevance to Bitemark Analysis, International Journal of Legal Medicine published online 4 September 2010.
852. Bush MA, Cooper HI, Dorion RBJ. Inquiry into the Scientific Basis for Bitemark Profiling and Arbitrary Distortion Compensation J Forensic Sci 2010; 55(4):976-83.
853. Bush MA, Miller RG, Bush PJ, Dorion RBJ, 2009 - Biomechanical factors in human dermal bitemarks in a cadaver model, J Forensic Sci, 54(1):167-76.
854. Bush MA, Miller RG, Dorion RBJ, Bush PJ, 2009 - The response of skin to applied stress: the influence of force per unit area in bite mark analysis. AAFS, Denver, Feb 19, 2009
855. Bush MA, Sheets HD. 2011 Mathematical matching of a dentition to bitemarks: Use and evaluation of affine methods. Forensic Science International (2010), doi:10.1016/j.forsciint.2010.09.013.
856. Bush MA, Thorsrud K, Miller RG, Dorion RBJ, Bush PJ, 2010 – The response of skin to applied stress: Investigation of bitemark distortion in a cadaver model, J Forensic Sci, 55(1):71–76.
857. Bush PJ, Miller RG, Dorion RBJ, Bush MA, 2008 - The role of the skin in bite marks, part III: microscopic analysis. AAFS, Washington, Feb 21, 2008

858. Bush PJ, Miller RG, Dorion RBJ, Bush MA, 2009 - The relationship of uniqueness and resolution in bite mark analysis. AAFS, Denver, Feb 19, 2009
859. Bush, M.A., 2011. Forensic dentistry and bitemark analysis. Journal of the American Dental Association. 142(9), pp.997-999.
860. Bush, M.A., Bush, P.J., and D.H. Sheets. "Statistical evidence for the similarity of the human dentition." *Journal of Forensic Sciences*, Vol. 56, No. 1 (2011): 118-23.
861. Bush, M.A., Cooper, H.I., and R.B. Dorion. "Inquiry into the scientific basis for bitemark profiling and arbitrary distortion compensation." *Journal of Forensic Sciences*, Vol. 55, No. 4 (2010): 976-83.
862. Bush, MA, Cooper, HI, Dorion, RBJ; 2010 – Inquiry into the Scientific Basis for Bitemark Profiling and Arbitrary Distortion Compensation, Forensic Sci, 55(4):976-983, July 2010.
863. Bush, MA, Thorsrud, K, Miller, RJ, Dorion, RBJ, Bush, PJ; 2010 - The response of skin to applied stress: investigation of bitemark distortion in a cadaver model. J Forensic Sci, 55(1):71-6.
864. Butler OH. Int J Forens Dent; 1(1):23-4 The value of bitemark evidence. 1973
865. Clement, J.G., 2011. Bite marks. Current Practices in Forensic Medicine.
866. Clement, J.G., Blackwell, S.A., 2010. Is current bite mark analysis a misnomer? Forensic Science International, 201(1-3), pp.33-37.
867. Clift A, Lamont CM. 1974 - Saliva in forensic odontology; J Forens Sci Soc; 14(3):241-5
868. CM Bowers 1: Forensic Dental Evidence, An Investigator's Handbook, Elsevier, 2004 pp. 157-169
869. Corbett ME, Spence D. Br Dent J; 157(8):270-1 A forensic investigation of teeth marks in soap. 1984
870. Cowan CD, Dewar A; 2006 - A Comparison between Traditional and 3-dimensional Imaging Techniques for the Identification of Human Bite Marks in Food Substances, BDS Elective Report, University of Glasgow 2006.
871. Cutignola L, Bullough PG; 1991 - Photographic reproduction of anatomic specimens using ultraviolet illumination; American J Surgical Pathology.
872. Dailey JC; 1991 - A practical technique for the fabrication of transparent bite mark overlays, J Forensic Sci, 36(2):565-70.
873. Dailey, J. C. and C. M. Bowers. 1997 Aging of bitemarks: A literature review. Journal of Forensic Sciences 42(5): 792-795.
874. Dailey, J. C., A. F. Shernoff, et al. (1989). "An Improved Technique for Bite Mark Impressions." Journal of Prosthetic Dentistry 61(2): 153-155.
875. Dailey, JC, Bowers, CM; 1995 - Aging of bitemarks: a literature review. In Manual of forensic odontology, 3rd Ed.
876. Daily JC, Bitemark Evidence, edited by RBJ Dorion, Marcel Dekker, New York; 2005: 444
877. Daniel, M.J., Bhardwaj, N., Srinivasan, S.V., Jimsha, V.K., Marak, F., 2015. Comparative study of three different methods of overlay generation in bite mark analysis. Journal of Indian Academy of Forensic Medicine, 37(1) pp.25-28.
878. David TJ. J Forens Sci; 31(3):1126-34 Adjunctive use of scanning electron microscopy in bitemark analysis: a 3D study. 1986
879. David, T. J. and M. N. Sobel (1994). "Recapturing a 5-Month-Old Bite Mark by Means of Reflective Ultraviolet Photography." Journal of Forensic Sciences 39(6): 1560-1567.
880. David, T.J., 2013. Current status of bitemark analysis in the United States: legal perspectives. The Journal of Forensic Odonto-stomatology, 31(Suppl1), pp.125-126.
881. Davis, JH; 2005 - Histology and Timing of Injury, Bitemark Evidence, Chapter 14, 257-273.
882. Dawson JB; 1980 - A Theoretical and Experimental Study of Light Absorption and Scattering by in Vivo Skin, Physics in Medicine and Biology, 25(4).
883. De las Heras, SM, Tafur, D; 2009 - Comparison of simulated dermal bitemarks possessing three-dimensional attributes to suspected biters using a proprietary three-dimensional comparison, Forensic Sci International, 1(1-3):33-7.

884. Desranleau S, Dorion RBJ, 2009 - Bite marks: physical properties of ring adhesion to skin. AAFS, Denver, Feb19, 2009
885. Desranleau S, Dorion RBJ, 2010 - Bite Marks: Physical properties of ring adhesion to skin - phase two. AAFS, Seattle, Feb 25, 2010
886. Desranleau S, Dorion RBJ. Bite Marks: Physical Properties of Ring Adhesion to Skin—Phase 1. J Forensic Sci, January 2011, Vol. 56, No. S1.
887. Devore D; 1974 - Ultraviolet Absorption and Fluorescence Phenomena Associated with Wound Healing, Thesis for Doctor of Philosophy, University of London, Oral Pathology, London Hospital Medical College, London.
888. DeVore DT. 1971 - Bitemarks for identification? A preliminary report, Med Sci Law, 11(3):144-5.
889. Dhar V, Tandon S; 1998 - Bitemark Analysis in child abuse, J Indian Soc Pedodon & Prevent Dentistry, 16(3):96-102.
890. Dinkel EH Jr. J Forens Sci; 19(3):535-47 Use of bitemark evidence as an investigative aid. 1974
891. Dorion RB. J Can Dent Assoc; 48(12):795-8 Bite mark evidence. 1982
892. Dorion RB. J Can Dent Assoc; 50(2):129-30 Preservation and fixation of skin for ulterior scientific evaluation and courtroom presentation. 1984
893. Dorion RB; 1987 - Transillumination in bite mark evidence, J Forens Sci; 32(3):690-7.
894. Dorion RBJ, 1992 - Lifting, preserving, storing and transporting skin: an eleven year study. AAFS, New Orleans, Feb 21, 1992
895. Dorion RBJ, 2001 - Bitemark project - Objectivity. AAFS, Seattle, Feb 23, 2001
896. Dorion RBJ, 2006 - Factors affecting bitemark analysis, AAFS, Seattle, Feb 24, 2006
897. Dorion RBJ, 2010 - Bite Mark Profiling Based Upon Color, UV, and ALI Photographic Interpretation. AAFS, Seattle, Feb 25, 2010
898. Dorion RBJ, Beehler R, Gromling T, Meza E, Perron MJ, Laforte S, 2007 - Bitemark research – Antemortem and postmortem bitemarks - Part 2. AAFS, San Antonio, Feb 22, 200
899. Dorion RBJ, ed.; 2005 - Bitemark Evidence, 2005 pgs 193-194.
900. Dorion RBJ, Perron MJ, Laforte S, Nielsen ML. 2006 -Bitemark research – Antemortem and postmortem bitemarks, AAFS, Seattle, Feb 24, 2006
901. Dorion RBJ. 1984 - Preservation and fixation of skin for ulterior scientific evaluation and courtroom presentation, J Can Dent Assoc, 50(2):129-130.
902. Dorion, R.B.J., 2011. Bitemark evidence: a color atlas and text, 2nd edition. CRC Press.
903. Dorion, RBJ, 1976 - Conclusions to research projects in forensic odontology: Preservation and transportation of foodstuff with bite mark evidence. AAFS, Washington, Feb 20, 1976
904. Dorion, RBJ, 1981 - Preliminary research on the preservation of traumatic injury patterns. Canadian Soc. Forens Sci, Hamilton, ON, Aug 1981
905. Dorion, RBJ, 1985 -Preservation in bite mark evidence: Inanimate objects, foodstuff and human tissues. AAFS, Las Vegas, Feb 12, 1985
906. Dorion, RBJ, 1987 - Experimental three dimensional ruler for use in bite mark evidence. AAFS, San Diego, Feb 20, 1987
907. Dorion, RBJ, 2005 - Bitemark Evidence,ed. 2005, ch.14 "Histology and Timing of Injury" pgs. 257-273.
908. Dorion, RBJ, 2007 - Bitemark analysis – Part 1 and 2 results, AAFS, San Antonio, Feb 22
909. Dorion, RBJ, 2011 - The gold standard. ABFO bitemark workshop #9. ABFO, Chicago, Feb 26, 2011
910. Dorion, RBJ,Editor; 2011 - Bitemark Analysis A Color Atlas and Text, Second Edition, CRC Press:Boca Raton.
911. Dorion, RBJ. Bitemark Evidence, edited Dekker:New York, NY; Research Projects and Recent Developments, Chapter 29, 573-575, 4.7, 4.8.
912. Dorion, RBJ. Bitemark Evidence, Marcel Dekker, New York; 2005 169-181
913. Dorion, RBJ; 2005 - Human Bitemarks, Bitemark Evidence, Chapter 17, 356-369.

914. Dorion, RBJ; 2005 - Nonperishables and Perishables, Bitemark Evidence, Chapter 12, 217-224.
915. Dorion, RBJ; 2005 - Research Projects and Recent Developments, Bitemark Evidence, Chapter 29, 573-575, 4.7, 4.8.
916. Dorion, RBJ; 2005 - Tissue Specimens, Bitemark Evidence, Chapter 13, 225-255
917. Dorion,R, 2005 - Bitemark Evidence, ed. 2005 chapter 13 pgs.225-255.
918. Drinnan AJ, Melton MJ. Int Dent J; 35(4):316-21 Court presentation of bitemark evidence. 1985
919. Eichmann C, Berger B, Reinhold M, Lutz M, Parson W; 2004 - Canine-specific STR typing of saliva traces on dog bite wounds, International J Legal Med, 118(6):337-42.
920. Elliot TR, Rogers AH, Haverkamp JR, Groothuis D; 1984 - Analytical pyrolysis of Streptococcus salivarius as an aid to identification in bitemark investigation, Forens Sci Int, 26(2):131-7
921. Ellis MA, Song F, Parks ET, Eckert GJ, Dean JA, Windsor J; 2007 - An evaluation of DNA yield, DNA quality and bite registration from a dental impression, JADA, 138:1234-1240.
922. Evans, S., Jones, C., Plassmann, P., 2010. 3D imaging in forensic odontology. Journal of Visual Communication in Medicine, 33(2), pp.63-68.
923. Evans, S., Jones, C., Plassmann, P., 2012. 3D imaging for bite mark analysis. Imaging Science Journal, 61(4).
924. Evans, S., Noorbhai, S., Lawson, Z., Stacey-Jones, S., Carabott, R., 2013. Contrast enhancement of bite mark images using the grayscale mixer in ACR in Photoshop. Journal of Forensic Science, 58(3), pp.804 – 810.
925. Farrell, W. L., R. D. Rawson, et al. (1987). "Computerized Axial-Tomography as an Aid in Bite Mark Analysis - a Case-Report." Journal of Forensic Sciences 32(1): 266-272.
926. Fearnhead RW. Med Sci Law; 1:273-77 Facilities for forensic odontology 1960
927. Fellingham SA, Kotze TJ, Nash JM; 1984 - Probabilities of Dental Characteristics, J Forensic Odonto-Stomatology, 2(2):45-52.
928. Figgener L. J Forensic Odont; 11(2):71-5 1993 Points of contact between quality issues and forensic aspects.
929. Fonseca, F, Orellano-Blaskovich; 2009 - Bitemark Analysis, J Forensic Dental Sci, 1(2):66-72.
930. Forensic Dentistry, 2ND Edition, Senn DR & Stimson PG, CRC Press:Boca Raton, 2010 pp. 216-236
931. Forensic Pathology – 2005 -Principles and Practice, Dolinak, Matshes, Lew; Chapter 27- Forensic Odontology, Souviron, Elsevier Academic Press:Waltham, MA pages 615-629.
932. Free EW, Brown KA. J Forensic Odont; 13(2):33-5 1995 A bitemark and a fracture?
933. Freeman, A. J., D. R. Senn, et al. (2005). "Seven hundred seventy eight bite marks: Analysis by anatomic location, victim and biter demographics, type of crime, and legal disposition." Journal of Forensic Sciences 50(6): 1436-1443.
934. Friar JA, West MH, Davies JE; 1989 - A new film for ultraviolet photography; J Forensic Sci, 34(1):234-38.
935. Friedich RE, Scheur HA, Schulz, F; 2005 - Assignment of a Bitemark on a Victim Skin to the Dentition of the Perpetrator by Means of Anomalies in the Number and Position of the Frontal Teeth. Arch Kriminol, 215 (1-2):11-7.
936. Furness J. Am J Forensic Med Pathol; 2(1):49-52 A general review of bitemark evidence. 1981
937. Furness J. Br Dent J; 124(6):261-7 A new method for the identification of teeth marks in cases of assault and homicide. 1968
938. Furness J. J Forensic Sci Soc; 9:126-75 Teeth marks and their significance in cases of homicide. 1969
939. Furness J. Probe; 11:221-22 Dental evidence in a case of rape. 1970
940. Furness J; 1968 - A new method for the identification of teeth marks in cases of assault and homicide, Br Dent J, 124(6):261-7.
941. Geroget CE, Baston WT. Recording and computerizing superimposition of human bite marks, AAFS, Odontolgy Section, Feb 13, 1999

942. Glass RT, Andrews EE, Jones K; 1980 - 3-D Bitemark evidence: a case report using accepted and new techniques, J Forensic Sci, 25(3):638-45.
943. Golden, G, and Wright, F; 2005 - Photography, Bitemark Evidence, Chapter 7, 87-168.
944. Golden, G. S. (1994). "Use of Alternative Light-Source Illumination in Bite Mark Photography." Journal of Forensic Sciences 39(3): 815-823.
945. Golden, G.S., 2011. Standards and practices for bite mark photography. Journal of Forensic Odonto-stomatol, 29(2), pp.29-37.
946. Golden, G.S., 2015. Bite-mark and pattern injury analysis: A brief status overview. Journal of California Dental Association, 43(6), pp.309-314.
947. Goodbody RA, Turner CH, Turner JL. Med Sci Law; The differentiation of toothed marks: report of a case of special interest. 1976 16(1):44-8.
948. Greenwald, AG; 1980 - The totalitarian ego: Fabrication and revision of personal history, American Psychologist, 35:603-18.
949. Grey, T. C. (1989). "Defibrillator Injury Suggesting Bite Mark." American Journal of Forensic Medicine and Pathology 10(2): 144-145.
950. Guilbault G; 1973 - Practical Fluorescence, Marcel Dekker, Inc.: New York, Basel, Hong Kong.
951. Gundelach A. J Forensic Odont; 7(2):11-6 1989 Lawyers' reasoning and scientific proof: a cautionary tale in forensic odontology.
952. Harvey et al. Int J leg Med; 1973; (8):3-15. Bite-marks the clinical picture; physical features etc.
953. Harvey W, Butler O, Furness J, Laird R. J, Forensic Sci Soc; 8(4):157-219 The Biggar murder. 1966
954. Havel DA Journal of Biological Photography. 53(2):59-62 1985 The role of photography in the presentation of bitemark evidence.
955. Hedman J, Dalin E, Rasmusson B, Ansell R; 2011 - Evaluation of amylase testing as a tool for saliva screening of crime scene trace swabs, Forensic Sci International, 5(3):194-8.
956. Hein PM, Pannenbecker J, Schulz E; 1992 - Bite injuries upon a newborn, International Journal of Legal Medicine, 105(1): 53-55.
957. Henderson JW; 1993 - Infrared photography revisited, J Audiovisual Media Med, 16.
958. Heras S, Tafur D; 2011 - Validity of a dichotomous expert response in bitemark analysis using 3-D technology, Science & Justice, 51:24–27.
959. Herschaft EE, Alder ME, Ord DK, Rawson RD, Smith ES, Editors; 2006 - Manual of Forensic Odontology, Fourth Edition, Chapter 4, American Society of Forensic Odontology.
960. Herschaft, E, Alder, M, Ord, D, Rawson. Smith, S; 2007 - Bite Mark Analysis, Manual of Forensic Odontology (Fourth Edition), Chapter 4, 171-182.
961. Hinchliffe, J., 2011. Forensic odontology, part 4. Human bite marks. British Dental Journal, 210(8), pp.363-368.
962. Hiss J, Freund M, Kahana T; 2007 - The forensic expert witness -- an issue of competency, Forensic Sci Int, 168(2-3):89-94.
963. Hodson JJ. Med Sci Law; 10(4):247-51 Forensic odontology and its role in the problems of the police and forensic pathologist. 1970
964. Holt JK. J Forensic Sci Soc; 20(4):243-6 Identification from bitemarks. 1980
965. Hyzer WG, Krauss TC; 1988 - The Bite Mark Standard Reference Scale--ABFO No. 2, J Forensic Sci, 33(2):498-506.
966. Irons F, Steuterman MC, Brinkhous W. Am J Forensic Med Pathol; 4(2):177-80 Two bitemarks on assailant. 1983
967. J.G. Clement, S.A. Blackwell, Is current bite mark analysis a misnomer? Forensic Sci. Int. (2010),doi:10.1016/ 2010.03.006.
968. Jakobsen J, Holmen L, Fredebo L, Sejrsen B. J Forensic Odont; (13)2:36-40 1995 Scanning electron microscopy, a useful tool in forensic dental work.

969. Jakobsen, JR, Keiser-Nelson, S; 1981 - Bite mark lesion in human skin. Forensic Science International, 18(1):41-55.
970. Jessee SA Paediatric Dentistry; 16(5):336-9 Recognition of bite marks in child abuse cases. 1994
971. Johansen R, BowersCM; 2000 - Digital Analysis of Bite Mark Evidence Using Adobe Photoshop, Forensic Imaging Services.
972. Johansen RJ, Bowers CM, Digital analysis of evidence photographs (bitemark): automated rectification of photographic distortion, resizing to life size, and rotation of images. AAFS, Atlanta, Feb 15, 2002
973. Johnson, L.T., 2014. Is bite mark analysis junk science? Identification news, 44(2), pp.16-17
974. Johnson, L.T., Blinka, D.D., Scotter-Asbach, V., Jean, P. and Radmer, T.W., 2008. Quantification of the Individual Characterstics of the Human Dentition: Methodology. Journal of Forensic Identification. 58(4), pp.409-18.
975. Johnson, L.T., Radmer, T.W., Jeutter, D., Stafford, G.L., Thulin, J., Wirtz, T., Corliss, G., Ahn, K.W., Visotky, A., Groffy, R.L., 2014. Replication of known dental characterizistics in porcine skin: Emerging technologies for the imagining specialist. NIJ Grant, Final Technical Report.
976. Johnson, L.T., Radmer, T.W., Wirtz, T.S., Pajewski, N.M., Cadle, D.E., Brozek, J. and Blinka, D.D., 2009. Quantification of the individual characteristics of the human dentition. Journal of Forensic identification. 59(6), pp.609-25.
977. Johnson, LT, Wirtz, TS, Radmer, TW; 2008 - The Verdict Is In: Can Dental Characteristics Be Quantified, Parts I & II. Scientific Sessions, Annual Meeting of the American Academy of Forensic Sciences, 2008.
978. Johnson, LT; 2005 - The Suspect, Bitemark Evidence, Chapter 19, 415-416.
979. Jonason CO, Frykholm KO, Frykholm A; 1974 - Three dimensional measurement of tooth impression of criminological investigation, Int J Forensic Dent, 2(6):70-8.
980. Kahl-Nieke B, Fischbach H, Schwarze CW; 1996 -Treatment and postretention changes in dental arch width dimensions- a long-term evaluation of influencing cofactors, Am J Orthod Dentofac Orthop, 109(4):368-78.
981. Karazalus GP, Palmbach TT, Lee HC, 2001. Digital enhancement of subquality bitemark photographs. Journal of Forensic Sciences 46 (4): 954-958.
982. Karazulas CP. J Forens Sci; 29(1):355-358 Presentation of bitemark evidence resulting in the acquittal of a man after serving seven years in prison for murder 1984
983. Kaur, S., Krishan, K., Chatterjee, P.M., Kanchan, T., 2013. Analysis and identification of bite marks in forensic casework. Journal of Oral Health and Dental Management, 12(3), pp.127-131.
984. Kaushal, N.; 2011 - Human Bite Marks In Skin: A Review, The Internet Journal of Biological Anthropology. 2011 Vol 4
985. Kenna J, Smyth M, McKenna L, Dockery C, McDermott SD; 2011 – The Recovery and Persistence of Salivary DNA on Human Skin, J Forensic Sci, 56 (1):170-75.
986. Kenney, JP, Spencer, DE; 1995 - Human Abuse and Neglect. Manual of Forensic Odontology (Third Edition), Chapter 6, 194.
987. Kerr NW. Int J Forensic Dent; 4:20-23 Apple bitemark identification of a suspect. 1977
988. Khatri, M., Daniel, M.J., Srinivasan, S.V., 2013. A comparative study of overlay generation methods in bite mark analysis. Journal of Forensic Dental Science, 5(1), pp.16-21.
989. Kieser, J. A. (1990, first publication). Human Adult Odontometrics. Cambridge Sudies in Biological Anthropology, Cambridge University Press. ISBN 0 521 35390 4.
990. Kieser, JA, Bernal, V, Waddell, J, Raju, S; 2007 - The uniqueness of the human anterior dentition: a geometric morphometric analysis. J For Sci , 52(3):671–677.
991. Kittelson JM, Kieser JA, Buckingham DM, Herbison GP. J For Odont. 2002; 20(2):31-7 Weighing evidence: Quantitative measures of the importance of bitemark evidence.
992. Kochevar IE, Pathok, MA, Parrish JA; Photophysics, photochemistry, photobiology; Dermatology in General Medicine, 4th ed.; McGraw-Hill:New York

993. Kouble, R. F. and G. T. Craig (2001). "Comparisons between direct and indirect techniques for bite mark analysis." Journal of Dental Research 80(4): 1179-1179.
994. Kouble, R. F. and G. T. Craig (2007). "A survey of the incidence of missing anterior teeth: Potential value in bite mark analysis." Science & Justice 47(1): 19-23.
995. Kouble, RF, Craig, CT; 2004 - A comparison between direct and indirect methods available for human bite mark analysis, J Forensic Sci, 49(1):111-118.
996. Krauss T; 1993 - Forensic evidence documentation using reflective ultraviolet photography, Photo Electronic Imaging.
997. Krauss TC, Warlen SC; 1985 - The forensic science use of reflective ultraviolet photography, J Forens Sci, 30(1):262-8.
998. Krauss TC; 1984 - Photographic techniques of concern in metric bite mark analysis, J Forens Sci, 29(2):633-8.
999. Lasser AJ, Warnick A; 2009 - Three-Dimensional Comparative Analysis of Bitemarks, J Forensic Sci, 54(3):658-61.
1000. Lasser, AJ, Warnick AJ, Berman GM, A unique way to analyze bite marks using 3D laser scanners and comparative software, AAFS, Atlanta, Feb 15, 2002
1001. Lassig R, Wenzel V, Weber M; 2006 - Bitemark Analysis in Forensic Routine Case Work, Excli Journal, 93-102
1002. Layton, JJ; 1966 - Identification from a bitemark in cheese, J Forensic Sci Soc, 6:76-80.
1003. Levine LJ Dent Clin N Amer; 21(1):145-158 Bitemark evidence. 1977
1004. Levine LJ, Beaghler RL. NY State Dent J; 36(9):539-42 Forensic odontology - a routine case and commentary. 1970
1005. Lewis, C., Marroguin, L.A., 2015. Effects of skin elasticity on bite mark distortion. Forensic Science International, 257, pp.293-296.
1006. Libal, A., 2014. Fingerprints, bite marks, ear prints. Solving Crimes with Science: Forensics.
1007. Ligthelm AJ, Coetzee WJ, van Niekerk PJ. J Forensic Odont;97 5(1):1-8 The identification of bite marks using the reflex microscope. 1987
1008. Ligthelm AJ, de Wet FA; 1983 - Registration of bitemarks: a preliminary report, J Forens Odontstomatol, 1(1):19-26.
1009. Ligthelm AJ, van Niekerk PJ J Forensic Odont; 12(2):23-9 Comparative review of bitemark cases from Pretoria, South Africa. 1994
1010. Lopez, T. T., M. G. H. Biazevic, et al. (2010). “National survey of the incidence of missing anterior teeth: Potential use in bite mark analysis in the Brazilian context.” Science & Justice 50(3): 119-122.
1011. Lunnon R; 1974 - Reflected ultraviolet photography in medicine; M.Phil.; University of London.
1012. Luntz, L. L. and P. Luntz. "Case in Forensic Odontology - Bite-Mark in a Multiple Homicide." Oral Surgery Oral Medicine Oral Pathology Oral Radiology and Endodontics 36(1): 72-78. 1973
1013. MacDonald DG, Laird WR Int J Forensic Dent; 3(10):26-30 Bitemarks in a murder case. 1976
1014. MacDonald DG, MacFarlane TW. Glasg Dent J; 3(1):16-9 Forensic odontology. 1972
1015. MacDonald DG; 1974 - Bite Mark Recognition and Interpretation, J Forensic Sci Society 14(3):229-33.
1016. MacFarlane TW., MacDonald DG, Sutherland DA; 1974 - Statistical problems in dental identification, J Forensic Sci Soc, 14(3):247-52.
1017. Mahajan, A., Batra, A.P., Khurana, B.S., Kaur, J., Seema, J., 2013. Role of bitemarks analysis in identification of a person. Global Journal of Medicine and public health, 1(1), pp.56-59.
1018. Mailis NP. J Forensic Odont; 11(1):31-3 1993 Bitemarks in forensic dental practice: the Russian experience.
1019. Maloth, S., Ganapathy, K.S., 2011. Comparison between five commonly used two dimensional methods of human bite mark overlay production from the dental study casts. Indian Journal of Dental Research, 22(3) pp.493.

1020. Martin-de las Heras, S., A. Valenzuela, et al. (2005). "Computer-based production of comparison overlays from 3D-scanned dental casts for bite mark analysis." Journal of Forensic Sciences 50(1): 127-133.

1021. Martin-de las Heras, S., A. Valenzuela, et al. (2007). "Effectiveness of comparison overlays generated with DentalPrint (c) software in bite mark analysis." Journal of Forensic Sciences 52(1): 151-156.

1022. Martin-de-las-Heras, S, Tafur D; 2011 - Validity of a dichotomous expert response in bitemark analysis using 3-D technology, Science & Justice, 51:24–27.

1023. Martin-de-las-Heras, S. and D. Tafur (2009). "Comparison of simulated human dermal bitemarks possessing three-dimensional attributes to suspected biters using a proprietary threedimensional comparison." Forensic Science International 190(1-3): 33-37.

1024. McCullough DC. Am J Forensic Med Pathol; 4(4):355-8 Rapid comparison of bitemarks by xerography. 1983

1025. McGivney, J. and R. Barsley (1999). "A method for mathematically documenting bitemarks." Journal of Forensic Sciences 44(1): 185-186.

1026. McKenna CJ, Haron MI, Taylor JA. J Forensic Odont, 1999;17: 40-43. Evaluation of a bitemark using clear acrylic replicas of the suspect's dentition

1027. McKinstry, R. E. (1995). 1995 "Resin Dental Casts as an Aid in Bite Mark Identification." Journal of Forensic Sciences 40(2): 300-302.

1028. McNamee, A. H. and D. Sweet (2003). "Adherence of forensic odontologists to the ABFO guidelines for victim evidence collection." Journal of Forensic Sciences 48(2): 382-385. Survey of practices.

1029. McNamee, A. H., D. Sweet, et al. (2005). "A comparative reliability analysis of computergenerated bitemark overlays." Journal of Forensic Sciences 50(2): 400-405.

1030. Metcalf, R. D. (2008). "Yet another method for marking incisal edges of teeth for bitemark analysis." Journal of Forensic Sciences 53(2): 426-429.

1031. Metcalf, R., Lee, G., Gould, L., Stickels, J., 2010. Bite this! The role of bite mark analyses in wrongful convictions. Southwest Journal of Criminal Justice, 7(1), pp.47-64.

1032. Miller RG, Bush PJ, Dorion RBJ, Bush MA, 2008 - The role of the skin in bite marks, part II: macroscopic analysis. AAFS, Washington, Feb 21, 2008

1033. Miller RG, Bush PJ, Dorion RBJ, Bush MA. Uniqueness of the Dentition as Impressed in Human Skin: A Cadaver Model. J Forensic Sci, 2009; 54(4):909-14.

1034. Millington PF. J Forensic Sci Soc; 14(3):239-40 1974 Histological studies of skin carrying bitemarks.

1035. Mills PB. Int J Forensic Dent; 3:38-9 An unusual case of bitemark identification. 1976

1036. Mishra, M.N., 2012. An insight to forensic odontology and its medico-legal application. Medico-Legal update, 12(1), pp.8-10.

1037. Miyaura K, Matsuka Y, Morita M, Yamshita A, Watanabe T; 1999 - Comparison of biting forces in different age and sex groups: a study of biting efficiency with mobile and non-mobile teeth, J Oral Rehab, 26(3):223-27.

1038. Moyers, RE, Riolo, ML, McNamara, JA; 1976 - Standards of Human Occlusal Development. Monograph 5, Craniofacial Growth Series. Center for Human Growth and Development, The University of Michigan, Ann Arbor.

1039. Murmann, D. C., P. C. Brumit, et al. (2006). "A comparison of animal jaws and bite mark patterns." Journal of Forensic Sciences 51(4): 846-860.

1040. Naether, S., Buck, U., Campana, L., Breitbeck, R., Thali, M., 2012. The examination and identification of bite marks in foods using 3D scanning and 3D comparison methods. International Journal of legal Medicine, 126(1) pp.89-95.

1041. Nakanishi H, Kido A, Ohmori T, Takada A, Hara M, Adachi N, Saito K; 2009 - A novel method for the identification of saliva by detecting oral streptococci using PCR, Forensic Sci International, 183:20-23.

1042. Nambiar P, Bridges TE, Brown KA, 1995. Quantitative forensic evaluation of bite marks with the aid of a shape analysis computer program: Part 2. SCIP and bite marks in skin and foodstuffs. Journal of Forensic Odontostomatology 13 (2): 26-32.
1043. Nambiar P, Bridges TE, Brown KA; 1995 - Quantitative forensic evaluation of bite marks with the aid of a shape analysis computer program: Part 1; The development of "SCIP" and the similarity index, J Forensic Odont, 13(2):18-25.
1044. Naru AS, Dykes E. Digital image cross-correlation technique for bite mark investigations. Sci Justice 1997; 37:251-258
1045. Naru AS, Dykes E; 1996 - The use of a digital imaging technique to aid bite mark analysis, Science & Justice, 36(1):47-50.
1046. Nuckles DB, Herschaft EE, Whatmough LN. General Dentistry. 42(3):210-4 1994 Forensic odontology in solving crimes: dental techniques and bite-mark evidence.
1047. Nuzzolese, E., Di Vella, G., 2012. The development of a colorimetric scale as a visual aid for the bruise age determination of bite marks and blunt trauma. Journal of Forensic Odonto-Stomatology, 30(2) pp.1-6.
1048. Old JB, Schweers BA, Boonlayangoor PW, Reich KA; 2009 - Developmental validation of RSID-saliva: a lateral flow immunochromatographic strip test for the forensic detection of saliva, J Forensic Sci, 54(4):866-73.
1049. Osborne, N.K., Woods, S., Kieser, J., Zajac, R., 2014. Does contextual information bias bitemark comparisons? Science & Justice, 54(4), pp.267-73.
1050. Page, M., Taylor, J., and M. Blenkin. "Expert interpretation of bitemark injuries – a contemporary qualitative study." *Journal of Forensic Sciences*, Vol. 58, No. 3 (2013): 664-72.
1051. Page, M., Taylor, J., Blenkin, M., 2012. Reality bites – A ten-year retrospective analysis of bitemark casework in Australia. Forensic Science International, 216(1-3), pp.82-87.
1052. Page, M., Taylor, J., Blenkin, M., 2013. Expert interpretation of bitemark injuries—a contemporary qualitative study. Journal of Forensic Science, 58(3), pp.664-672.
1053. Patil, S., Roopa, R.S., Thirumal, R., 2013. A comparison between manual and computerized bite-mark analysis. Journal of Advanced Oral Research, 4(1).
1054. Perper JA, Menges DJ; 2011 - The skin as a repository and masker of evidence, Amer J Forensic Med Pathology, 1:56-62.
1055. Perrier M, Horisberger B, Mangin P. A bite mark case presentation: examination and computer imaging analysis. AAFS, Odontology Section, Feb 13, 1999
1056. Perron MJ, Dorion RBJ, 2010 - Bite marks on a live victim: data collection, healing process, and loss of details. AAFS, Seattle, Feb 25, 2010
1057. Perron MJ, Dorion RBJ, 2010 - Macroscopic and Microscopic Study of the Effects of Freezing and Thawing on Bite Marks. AAFS, Seattle, Feb 25, 2010
1058. Phillips BG, Bush PJ, Miller RG, Dorion RBJ, Bush MA, 2008 - The role of the skin in bite marks, part IV: clothing weave transfer. AAFS, Washington, Feb 21, 2008
1059. Pretty AI; 2008 – Forensic Dentistry: 2 Bitemarks and Bite Injuries, Dent Update 35:48-61.
1060. Pretty IA, Sweet D. Digital bite mark overlays- an analysis of effectiveness. J Forens Sci 2001; 46: 1358-1391
1061. Pretty IA, Sweet D. J For ODont 24;1: 2006. The judicial view of bitemarks within the United States Criminal Justice system.
1062. Pretty IA, Sweet D., 2000 - Anatomical location of bitemarks and associated findings in 101 cases from the United States, J Forensic Sci, 2000 Jul; 45(4):812-4.
1063. Pretty IA, Sweet D; 2001 - The scientific basis for human bitemark analyses – a critical review, Science & Justice, 41(2): 85-92.
1064. Pretty IA, Turnbull MD. 2001 Lack of dental uniqueness between two bite mark suspects.

1065. Pretty IA. For Sci Int 159;1 S110-120. 2006 The barriers to achieving an evidence base for bitemark analysis.
1066. Pretty IA; 2003 - A web-based survey of odontologist's opinion concerning bitemark analysis, J Forens Sci, 48(5):1117-20.
1067. Pretty, I. A. (2007). "Development and validation of a human bitemark severity and significance scale." Journal of Forensic Sciences 52(3): 687-691.
1068. Pretty, I. A. and D. Sweet (2000). "Anatomical location of bitemarks and associated findings in 101 cases from the United States." Journal of Forensic Sciences 45(4): 812-814.
1069. Pretty, I. A. and D. Sweet (2001). "Digital bite mark overlays - An analysis of effectiveness." Journal of Forensic Sciences 46(6): 1385-1391.
1070. Pretty, I. A. and R. C. Hall (2002). "Forensic dentistry and human bite marks: issues for doctors." Hospital Medicine 63(8): 476-482.
1071. Pretty, I.A., Sweet, D., 2010. A paradigm shift in the analysis of bitemarks. Forensic Science International, 201(1-3) pp.38-44.
1072. Pretty, IA "Resolving Issues in Bitemark Analysis" in *Bitemark Evidence: A Color Atlas* RBJ Dorian, Ed. CRC Press. Chicago 2011.
1073. Pretty, IA, Sweet, D; 2001 - Digital bite mark overlays - An analysis of effectiveness, J Forensic Sci, 46(6):1385-1391.
1074. Pretty, IA, Sweet,D; 2001 – Adherence of forensic odontologists to the ABFO bite mark guidelines for suspect evidence collection, J Forensic Sci, 46(5):1152-8.
1075. Pretty, IA; 2007 - Development and validation of a human bitemark severity and significance scale, J Forensic Sci, 52(3):687-691.
1076. Radford, G, Kieser, G, Bernal, JA, Waddell, V, Forrest, JN; 2009 - Bitemark Reconstruction; J Forensic Odontostomatol, 27(1):33-36.
1077. Radmer TW, Johnson LT, Yang M, Wirtz T; 2009 - The quantification of tooth displacement, J For Ident, 60(1):4-18.
1078. Radmer, T.W., Johnson, L.T., Yang, M. and Wirtz, T., 2010. The Quantification of Tooth Displacement. Journal of Forensic Identification. 60(1), pp.4-18.
1079. Radmer, TW, Johnson, LT; 2009 - The correlation of dental arch width and ethnicity, J For Ident, 59(3):270-74.
1080. Raekallio, J; 1972 - Determination of the age of wounds by histochemical and biochemical methods. Forensic Science, 1, 3-16.
1081. Rahimi, M., N. C. K. Heng, et al. (2005). "Genotypic comparison of bacteria recovered from human bite marks and teeth using arbitrarily primed PCR." Journal of Applied Microbiology 99(5): 1265-1270.
1082. Rajshekar, M., Kruger, E., Tennant, M., 2012. Photographic imaging distortion and its effects on forensic bite mark analysis. Journal of Advanced Oral Research, 3(3), pp.1-6.
1083. Randerson, J. (2004). "Bite-mark evidence can leave a false impression." New Scientist 181(2438): 6-7.
1084. Rao VJ, Souviron RR. J Forensic Sci; 19(1):326-30 1984 Dusting and lifting the bite print: a new technique
1085. Rawson RD, Bell A, Kinard BS, Kinard JG; 1979 - Radiographic interpretation of contrast-media-enhanced bite marks, J Forens Sci, 24(4):898-901.
1086. Rawson RD, Brooks S; 1984 – Classifiaction of Human Breast Morphology Important to Bite Mark Investigation Am J Forensic Med Path 5(1):19-24.
1087. Rawson RD, Vale GL, Sperber ND, Herschaft EE, Yfantis A; 1986 - Reliability of the Scoring System of the American Board of Forensic Odontology for Human Bite Marks, J Forens Sci, 31(4):1235-60.
1088. Rawson RD, Vale GL; 1986 - Analysis of photographic distortion in bitemarks: a report of the bitemark guidelines committee, J Forens Sci, 31(4):1261-8.

1089. Rawson RD. J Forens Sci; 29(1):254-9 Incidence of bitemarks in a selected juvenile population: a preliminary report. 1984
1090. Rawson RD; 1984 - Statistical evidence for the individuality of the human dentition, J Forens Sci, 29(1):245-53.
1091. Rawson, R. B., G. H. Starich, et al. (2000). "Scanning electron microscopic analysis of skin resolution as an aid in identifying trauma in forensic investigations." Journal of Forensic Sciences 45(5): 1023-1027.
1092. Rawson, RD, Ommen, RK, Kinard, G, Johnson, J., Yfantis, A; 1984 - Statistical evidence for the individuakity of the human dentition. J For Sci, 29(1):245-253.
1093. Ray B; 1992 - Use of Alternate Light Sources for Detection of Body Fluids, Southwestern Association of Forensic Science Journal, 14(1)
1094. Regan JD, Parrish JA; 1982 - The science of photomedicine. In: Optical Properties of Human Skin, Plenum Press:New York.
1095. Riaud, X., 2014. Convicted by a bite mark, Ted Bundy (1946-1989). Journal of the History of Dentistry, 59, pp.11-13.
1096. Robertson, I, Hodge, PR; 1972 - Histopathology of healing abrasions. Forensic Science, 1, 17-25.
1097. Robinson E, Wentzel J. J Forensic Sci; 37(1):195-207 1992 Toneline bite mark photography.
1098. Rothwell BR. JADA; 126(2):223-32 1995 Bite marks in forensic dentistry: a review of legal, scientific issues.
1099. Rothwell, B. R. and A. V. Thien (2001). "Analysis of distortion in preserved bite mark skin." Journal of Forensic Sciences 46(3): 573-576.
1100. Rothwell, BR , Thien AV; 2001 - Analysis of distortion in Preserved Bite Mark Skin, J Forensic Sci, 46(3): 573-576.
1101. Rothwell, BR; 1995 - Bitemarks in Forensic Dentistry, J Amer Dent Assoc, 126:223-232.
1102. Ruddick RF; 1974 - A technique for recording bitemarks for forensic studies, Med Biolo Illus, 24(3):128-9
1103. Rudland M. Med Sci Law; 22(1):47-50 1982 The dimensional stability of bitemarks in apples after long-term storage in a fixative.
1104. S.L. Avon, et al., Error rates in bite mark analysis in an in vivo animal model, Forensic Sci. Int. (2010), doi:10.1016/j.forsciint.2010.04.016.
1105. Santoro, V., Lozito, P., De Donno, A., Introma, F., 2011. Experimental study of bite mark injuries by digital analysis. Journal of Forensic Sciences, 56(1), pp.224-228.
1106. Saxena, S., Sharma, P., Gupta, N., 2010. Experimental studies of forensic odontology in aid in the identification process. Journal of Forensic Dental Sciences, 2(2), pp.69-76.
1107. Senn DR, Stimson PG; 2010 - Forensic Dentistry. 2nd ed., CRC Press:Boca Raton.
1108. Senn, DR, Alder ME, Brumit PC, White M. Scanning electron microscopy and digital imaging software in bite mark analysis: technique in case report, AAFS meeting, Odontology Section, Seattle, Feb 23, 2001
1109. Sheasby DR, MacDonald DG; 2001 – A Forensic Classification of Distortion in Human Bite Marks, Forensic Sci International 122(1):75-78.
1110. Sheasby DR, McDonald DG; 2001 – A forensic classification of distortion in human bite marks. Forensic Sci International, 122:75-78,
1111. Sheets HD, Bush MA; 2011 - Mathematical matching of a dentition to bitemarks: Use and evaluation of affine methods, Forensic Sci International, 207:111-118.
1112. Sheets HD, Bush PJ, Brzozowski C, Nawrocki LA, Ho P, Bush MA. Dental shape match rates in selected and orthodontically treated populations in New York State: A 2 dimensional study. J Forensic Sci, 2011;56(3):621-6.

1113. Sheets, H.D., Bush, P.J., and M.A. Bush. “Bitemarks: distortion and covariation of the maxillary and mandibular dentition as impressed in human skin.” *Forensic Science International*, Vol. 223, No. 1-3 (2012): 202-7.
1114. Silver, W and Souviron R 2009 - Dental Autopsy, CRC Press: Boca Raton, FL, Chapter 13 pages 151-193.
1115. Simon A, Jordan H, Pforte K. Int J Forens Dent; 2:17-2 Successful identification of a bitemark in a sandwich. 1974
1116. Sims BG, Grant JH, Cameron JM. Med Sci Law; 13(3):207-10 Bitemarks in the 'battered baby' Syndrome1973
1117. Singh, K., Anandani, C., Bhullar, R.P.K., Agrawal, A., Ghaudhary, H., Thakral, A., 2012. Teeth and their secrets? Forensic dentistry. Journal of Forensic Research, 3(1).
1118. Sirakova, M., Debelle, G., 2014. Identifying human bite marks in children. Pediatrics and Child Health, 24(12) pp.550 – 556.
1119. Sobel, M. N. and J. A. Perper (1985). "Self- Inflicted Bite Mark on the Breast of a Suicide Victim." American Journal of Forensic Medicine and Pathology 6(4): 336-339.
1120. Sognnaes RF, 1977 - The case for better bite and bitemark preservations, Int J Forensic Dent, 4(13).
1121. Sognnaes RF, Rawson RD, Gratt BM, Nguyen NB, 1982 - Computer comparison of bitemark patterns in identical twins, JADA, 105(3):449-51.
1122. Sognnaes RF, Therrell R. J Cal Dent Assoc; 3(10):50-3 1975 Bitemark lesions in human skin caused by an unequivocally identified 'suspect'.
1123. Sognnaes RF. Dental Survey; 54(12):12-24 Forensic oral measurements. 1978
1124. Sognnaes RF. Int J Forensic Dent; 3(9):14-6 Dental science as evidence in court. 1976
1125. Sognnaes RF. Int J Forensic Dent; 4(13):17- 20 The case for better bite and bitemark preservations. 1977
1126. Sognnaes RF. J Cal Dent Assoc; 4:22-8 Battered child death involving enigmatic bitemark evidence. 1977
1127. Sognnaes RF. New Eng J Med; 296:79-85 Forensic stomatology. 1977
1128. Sognnaes, R. F., R. D. Rawson, et al. (1981). "Computer Comparison of Radiographic Bite-Mark Patterns in Identical-Twins." Journal of the Forensic Science Society 21(2): 144-144.
1129. Sognnaes, RF, Rawson, RD, Gratt, BM, Nguyen, NB; 1976 - Computer comparison of bitemark patterns in identical twins. J Am Dent Assoc, 105(3):449-451.
1130. Solheim T, Leidal TI; 1975 - Scanning electron microscopy in the investigation of bitemarks in foodstuffs, Forensic Sci, 6(3):205-15.
1131. Soukos NS, Crowley K, Bamberg MP, Gillies R, Doukas AG, Evans R, Kollias N; 2000 - A rapid method to detect dried saliva stains swabbed from human skin using fluorescence spectroscopy, Forensic Sci International, 114(3):133-138.
1132. Sperber N. Forensic Sci Int; 30(2-3):187-93 Identification of children and adults through federal and state dental identification systems: recognition of human bitemarks. 1986
1133. Sperber ND, Lubin H. J Am Col Health Association.; 29(4):165-7 Bite mark evidence in crimes against persons. 1981
1134. Sperber, N. D. (1984). "A Bite Mark Being the Only Item of Physical Evidence That Led to the Conviction of a Suspect in a Southern Californian Mutilation Homicide Case." Journal of the Forensic Science Society 24(4): 304-305.
1135. Sperber, N. D. (1984). "Procedures in Recording Bite Mark Evidence in Sexual Assault and Child-Abuse Cases." Journal of the Forensic Science Society 24(4): 305-305.
1136. Sperber, N; 1986 – Identification of children and adults through federal and state dental identification systems: recognition of human bite marks, Forensic Sci In, 30(2-3):187-93.

1137. Stavrianos C, Vasiliadis L, Emmanouil J, Papadopoulos C; 2011 – In Vivo Evaluation of the Accuracy of Two Methods for the Bite Mark Analysis in Foodstuff, DOI 10.3921/rjmsci.2011.25.31, Res J Med Sci 5(1):25-31.
1138. Stoddart TJ; 1973 - Bitemarks in perishable substances. A method of producing permanent models, Br Dent J, 135(6):285-7.
1139. Stoilovic M; 1991 - "Detection of Semen and Blood Stains Using Polilight as a Light Source," Forensic Science International, 51.
1140. Stokes GG; On the Change of Refrangibility of Light, Phil Trans, R Soc London, 1853:385
1141. Stols, G. and H. Bernitz (2010). "Reconstruction of Deformed Bite Marks Using Affine Transformations." Journal of Forensic Sciences 55(3): 784-787.
1142. Summers, R. and D. A. Lewin (1988). "Photographic Procedures Relating to Bite Mark Evidence." Journal of the Forensic Science Society 28(3): 211-212.
1143. Suzuki, K., M. Hashimoto, et al. (1981). "Bite Mark Evidence - a Case-Report and Preliminary- Study." Journal of the Forensic Science Society 21(2): 147-148.
1144. Sweet D, Bowers CM, 1998. Accuracy of bite mark overlays: A comparison of five common methods to produce exemplars from a suspect's dentition. Journal of Forensic Sciences 43 (2): 362-367.
1145. Sweet D, Hildebrand D; 1999 - Saliva from cheese bite yields DNA profile of a burglar: a case report, International J Legal Med, 112:201-203.
1146. Sweet D, Lorente JA, Valenzuela A, Lorente M, Villanueva E; 1997 - PCR-based DNA typing of saliva stains recovered from human skin, J Forensic Sci, 42(3):447-51.
1147. Sweet D, Parhar M, Wood RE, 1998 - Computer-based production of bite mark comparison overlays. J Forensic Sci, 1998 Sep; 43(5):1050-5.
1148. Sweet D, Parhar M, Wood RE. Computer-based production of bite mark comparison overlays. J Forens Sci 1998; 43:1050-1055
1149. Sweet D; PCR- 1997 - Based DNA Typing of Saliva Stains Recovered from Human Skin J Forensic Sci, 42(3):447-51.
1150. Sweet, D. and G. G. Shutler (1999). "Analysis of salivary DNA evidence from a bite mark on a body submerged in water." Journal of Forensic Sciences 44(5): 1069-1072.
1151. Sweet, D. and I. A. Pretty (2001). "A look at forensic dentistry - Part 2: Teeth as weapons of violence - identification of bitemark perpetrators." British Dental Journal 190(8): 415-418.
1152. Sweet, D., Lorente M, Lorente JA, Valenzuela A, Villanueva E; 1997 - An improved method to recover saliva from human skin: The double swab technique, J Forensic Sci, 42(2):320-322.
1153. Sweet, DJ; 1995 - Bitemark Evidence, Manual of Forensic Odontology (Third Edition), Chapter 5, 151-188.
1154. SWGDE/SWGIT digital and multimedia evidence glossary version 2.3 (May 22, 2009) p8.
1155. Tavris, C, Aronson, E; 2007 - Mistakes were made (but not by me), 1st ed. 2007,
1156. Taylor DV. Brit Dent J; 114:389 The law and the dentist. 1963
1157. Texas Forensic Science Commission. "Forensic bitemark comparison complaint filed by National Innocence Project on behalf of Steven Mark Chaney – Final Report." (2016).
1158. Thali, M. J., A. Braun, et al. (2003). "Bite mark documentation and analysis: the forensic 3D/CAD supported photogrammetry approach." Forensic Science International 135(2): 115-121.
1159. The manual of photogrammetry, 4th ed. 1980. Quoted in SWGIT guidelines, section 12.
1160. Thompson IO, Phillips VM. J Forensic Odont; 12(2):37-40 A bitemark case with a twist. 1994
1161. Tuceryan, M., Li, F., Blitzer, H., Parks, T., Platt, J., 2010. A framework for estimating probability of a match in forensic bite mark identification. Journal of Forensic Sciences, 56(suppl 1) pp.S83-S89.
1162. Vale GL, Noguchi TT. J Forens Sci; 28(1):61-9 1983 Anatomical distribution of human bitemarks in a series of 77 cases.

1163. Vale GL, Rawson RD; 1988 - Discussion of "Reliability of the scoring system of the ABFO for human bitemarks," J Forensic Sci, 33(1):20.
1164. Vale GL, Sognnaes RF, Felando GN, Noguchi TT. J Forensic Sci; 21(3):642-52 Unusual three-dimensional bitemark evidence in a homicide case. 1976
1165. Vale GL. J Cal Dent Assoc; 24(5):29-34 1996 Dentistry, bite marks and the investigation of crime.
1166. Vale, J, Noguchi, TT; 1983 - Anatomical distribution of human bitemarks in a series of 67 cases. Journal of Forensic Sciences, 28 (1), 61-9.
1167. Van der Velden; 2006 - Bite mark analysis and comparison using image perception software, J Forensic Odont, 24(1)14-7.
1168. Vanezis, P; 2001 - Interpreting bruises at necropsy, J Clin Pathology, 54:348-55.
1169. Verma, A.K., Kumar, S., Bhattacharya, S., 2013. Identification of a person with the help of bite mark analysis. Journal of Oral Biology and Craniofacial Research, 3(2), pp.88-91.
1170. Verma, K, Joshi, B., Joshi, C, Paul, R., 2013. Bite marks as physical evidence from the crime scene-an overview. Journal of Forensic Research, 2(1).
1171. Vogeley EM, Pierce C, et al; 2002 - Experience with wood lamp illumination and digital photography in the documentation of bruises on human skin, Arch Ped & Adolescent Med, 156(3): 265-268.
1172. Vogeley, E., M. C. Pierce, et al. (2002). "Experience with wood lamp illumination and digital photography in the documentation of bruises on human skin." Archives of Pediatrics & Adolescent Medicine 156(3): 265-268.
1173. von Wurmb-Schwark N, Mályusz V, Fremdt H, Koch C, Simeoni E, SchwarkFast T; 2006 - Simple DNA extraction from saliva and sperm cells obtained from the skin or isolated from swabs, Legal Medicine, (Tokyo) 8(3):177-181.
1174. Wagner GN. Pediatric Dentistry 1986;8: Special issue 1. 96-100 1986 Bitemark identification in child abuse cases.
1175. Wallace, CG, Urso-Baiarda, FG; 2005 - Human bite injuries. Annals of the Royal College of Surgeons of England, 87(4):295.
1176. Walter RA. Am J Forensic Med Pathol; 5(1):25-9 1984 An examination of the psychological aspects of bitemarks.
1177. Walter RD. Am J Forensic Med Pathol; 6(3):219-21 Anger biting - the hidden impulse. 1985
1178. Warnick AJ, Biedrzycki L, Russanow G. J Forensic Sci; 32(3):788-92 Not all bite marks are associated with abuse, sexual activities, or homicides: a case study of a self-inflicted bitemark. 1987
1179. Webb, D. A., D. Sweet, et al. (2002). "Forensic implications of biting behavior: A conceptually underdeveloped area of investigation." Journal of Forensic Sciences 47(1):103-106.
1180. Webster G. Forensic Sci Int; 20(1):45-52 1982 A suggested classification of bitemarks in foodstuffs in forensic dental analysis.
1181. West MH, Barsley RE, Frair J, Seal MD. J Forensic Sci; 35(6):1477-85 1990 The use of human skin in the fabrication of a bite mark template: two case reports.
1182. West MH, Barsley RE, Frair J, Seal MD; 1990 -The use of human skin in the fabrication of a bite mark template: two case reports, J Forensic Sci, 35(6):1477-85.
1183. West MH, Barsley RE. Mississippi D Ass J; 46(4):7, 11-2 1990 First bite mark convictions in Mississippi.
1184. West MH, Hayne S, Barsley RE. 1996 Wound patterns: detection, documentation and analysis. J Clinical Forensic Med (1996)3, 21-7.
1185. Whittaker DK Dental Update; 17(9):386-90 1990 Principles of forensic dentistry: 2. Non-accidental injury, bitemarks and archaeology.
1186. Whittaker DK, Brickley MR, Evans L; 1998 - A comparison of the ability of experts and non-experts to differentiate between adult and child human bite marks using receiver operating characteristic (ROC) analysis, Forensic Sci Int, 92(1):11-20.

1187. Whittaker DK, Watkins KE, Wiltshire J; 1975 - An experimental assessment of the reliability of bitemark analysis, Int J Forensic Dent, 3:2-7.
1188. Whittaker, D.K. "Some laboratory studies on the accuracy of bitemark comparison." *International Dental Journal,* Vol. 25, No. 3 (1975): 166–71.
1189. Whittaker, DK; 1975 - Some laboratory studies on the accuracy of bitemark identification, Int Dent J, 25:166-171.
1190. Williams RG, Porter BE; 1997 - Forensic dentistry. Documentation of bite-mark evidence using multiple computer-assisted techniques, J Oklahoma Dent Assoc, 88(2):29-30.
1191. Wood RE, Miller PA, Blenkinsop BR; 1994 - Image editing and computer assisted bitemark analysis: a case report, J Forensic Odont, 12(2):30-6.
1192. Woolridge ED. Int J Forens Dent; 2(1):6-12 Significant problems of the forensic odontologist in the USA. 1973
1193. Wright FD, Golden G; 1997 - Forensic Dentistry, in: Stimson P, Mertz C, Eds. Boca Raton. FL: CRC Press.
1194. Wright FD, Golden GS; 2010 - The use of full spectrum digital photography for evidence collection and preservation in cases involving forensic odontology, Forensic Science International, 201(1-3):59-67.
1195. Wright FD. J Forensic Sci; 43(4):881-7 1998 Photography in bite mark and patterned injury documentation. Part 2: A case study.
1196. Wright FD; 1998 - Photography in Bite Mark and Patterned Injury Documentation, Part 1 case study, J For Sci, 43(5)871-81.
1197. Wright FD; 2001 - The trials and tribulations of bite mark analysis: seeing what is really there. AAFS Annual Meeting Seattle, Presentation F23.
1198. Wright, F. D. and G. S. Golden (2010). "The use of full spectrum digital photography for evidence collection and preservation in cases involving forensic odontology." Forensic Science International 201(1-3): 59-67.
1199. Wright, F.D., Dailey, J.C.; 2001 - Human bitemarks in Forensic Dentistry, Dent Clin North America, 45(2):365-97.
1200. Zarkowski P. J Law & Ethi Dent; 1(1):47-57 Bite mark evidence: its worth in the eyes of the expert. 1988

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1201. Abrego, A., Grijalba, N., Unceta, N., Maqurequi, M., Sanchez, A., Fernandez-Isla, A., Goicolea, M.A., Barrio, R.J., 2014. A novel method for the identification of inorganic and organic gunshot residue particles of lead-free ammunitions from the hands of shooters using scanning laser ablation-ICPMS and Raman micro-spectroscopy. Analyst, 139(23), 6232-6241.
1202. Abrego, A., Ugarte, A., Unceta, N., Fernandez-Isla, A., Goicolea, M.A., Barrio, R.J., 2012. Unambiguous characterization of gunshot residue particles using scanning laser ablation and inductively coupled plasma-mass spectrometry. Analytical Chemistry, 84(5), pp.2402-2409.
1203. AFTE Committee for the Advancement of the Science of Firearm & Toolmark Identification. 2010. AFTE Response to the NACDL Task Force on the Future of Forensic Science. AFTE Journal, 42(2) pp.102-107.
1204. AFTE Committee for the Advancement of the Science of Firearm and Toolmark Identification. (2011, June 14). AFTE Response to the 25 Questions related to firearms and toolmark examinations promulgated by the RDT&E IWG.
1205. AFTE Criteria For Identification Committee Report: Theory of Identification, Range of Striae Comparison Reports and Modified Glossary Definitions-an AFTE Criteria For Identification Committee Report, AFTE Journal, Vol. 24, No. 3, July 1992, pp. 336-340.
1206. Aguilar, J.R., 2015. Gunshot detection systems in civilian law enforcement. Journal of Audio Engineering Society, 63(4), pp.280-291

1207. Amadasi, A., Brandone, A., Rizzi, A., Mazzarelli, D., Cattaneo, C., 2012. The survival of metallic residues from gunshot wounds in cremated bone: a SEM-EDX study. International Journal of Legal Medicine, 126(4), pp.525-531.

1208. Amadasi, A., Merli, D., Brandone, A., Cattaneo, C., 2014. Chromatic variation of soot soiling: a possible marker for gunshot wounds in burnt bone. Journal of Forensic Sciences, 59(1), pp.195-198.

1209. Amstead, B.H., Ostwald, P.F., Begeman, M.L., Manufacturing Processes, Wiley & Sons, 8th Edition, 1987

1210. Association of Firearm and Tool Mark Examiners (AFTE) Journals, July 1992, Vol. 24, No. 3 and Fall 2011, Vol. 43, No. 4.

1211. Association of Firearm and Tool Mark Examiners. "Theory of Identification as it Relates to Tool Marks: Revised." *AFTE Journal*, Vol. 43, No. 4 (2011): 287.

1212. Association of Firearm and Toolmark Examiners. (2011), Fall Volume 43 Number 4). Theory of Identification as it Relates to Toolmarks: Revised. AFTE Journal, p. 287.

1213. Austin, Peter F., The Identification of Bullets Fired From High Velocity Rifles with Consecutively Rifled Micro-Groove Barrels, Presented at the Firth International Meeting of Forensic Sciences – University of Toronto, Toronto, Ontario, Canada, June 5 to 11, 1969.

1214. Bacharach, B. (2009) Statistical Validation on the Individuality of Tool Marks Due to the Effect of Wear, Environment Exposure and Partial Evidence, NIJ/NCJRS Document #227929.

1215. Bachrach B., Jain A., Jung S., and Koons R.D. (2010) A Statistical Validation of the Individuality and Repeatability of Striate Tool Marks: Screwdrivers and Tongue and Groove Pliers. Journal of Forensic Sciences, Vol. 55, No. 2, pp 348-357.

1216. Bachrach, B. (2000). Ballistic Matching Using 3D Images of Bullets and Cartridge Cases: Project Summary. National Institute of Justice Grant Award Number 97-LB-VX-0008.

1217. Bachrach, B. (2002). Development of a 3D-Based Automated Firearms Evidence Comparison System. Journal of Forensic Sciences, vol. 47 (6), 1253-1264.

1218. Bachrach, B., 2009. Statistical Validation on the Individuality of Tool Marks Due to the Effect of Wear, Environment Exposure, and Partial Evidence. U. S. Department of Justice, National Institute of Justice NCJRS 2279, pp. 1-77.

1219. Baiker, M., Keereweer, I., Pieterman, R., Vermeij, E., van der Weerd, J. and Zoon, P., 2014. Quantitative comparison of striated toolmarks. Forensic science international, 242, pp.186-199.

1220. Baker, N., The Campbell Case, American Journal of Police Science, Jan – Feb, 1931, 3(1): 21-31

1221. Baldwin, D., Morris, M., Bajic, S., Zhou, Z. and Kreiser, J., 2004. Statistical tools for forensic analysis of toolmarks. No. IS-5160. Ames Lab., IA.

1222. Baldwin, D.P., Bajic, S.J., Morris, M. and Zamzow, D., 2014. A Study of False-Positive and False-Negative Error Rates in Cartridge Case Comparisons. USDOE Technical Report # IS-5207.

1223. Baldwin, et al, "Statistical Tools for Forensic Analysis of Toolmarks," Ames Laboratory, Iowa State University, Report IS-5160, 2011

1224. Balthazard, V. (2004). Identification of Projectiles from Firearms. AFTE Journal, Vol. 36, No. 3. Pp 219-225. (REPRINT from Identification de Projectiles d'Armes a Feu. Archives d'Anthropologie Criminelle. Vol. 28 (1913), pp 421-433.

1225. Bandodkar, A., O'Mahony, A., Ramirez, J., Samek, I., Anderson, S., Windmiller, J., Wang, J., 2013. Solid-state forensic finger sensor for integrated sampling and detection of gunshot residue and explosives: towards 'Lab-on-a-finger'. Analyst, 138, pp.5288-5295.

1226. Banno, A., Masuda, T. and Ikeuchi, K., 2004. Three dimensional visualization and comparison of impressions on fired bullets. Forensic science international, 140(2), pp.233-240.

1227. Banno, Atsuhiko. (2004). Estimation of Bullet Striation Similarity Using Neural Networks. Journal of Forensic Sciences, Vol 49, No 3. pp 1-5.

1228. Barrett, M., Tajbakhsh, A. and Warren, G., 2011. Portable forensic ballistics examination instrument: Advanced ballistics analysis system (alias). AFTE Journal, 43(1), pp.74-78.
1229. Benito, S., Abrego, Z., Sanchez, A., Unceta, N., Goicolea, M.A., Barrio, R.J., 2015. Characterization of organic gunshot residues in lead-free ammunition using a new sample collection device for liquid chromatography-quadrupole time-of-flight mass spectrometry. Forensic Science International, 246, pp.79-85.
1230. Biasotti, A. (1959). A Statistical Study of the Individual Characteristics of Fired Bullets. Journal of Forensic Sciences, vol. 4 (1), 34-50.
1231. Biasotti, A. (1964). The Principles of Evidence Evaluation as Applied to Firearms and Tool Mark Identification. Journal of Forensic Sciences, Vol. 9, No. 4. pp 428-433.
1232. Biasotti, A. A., "A Statistical Study of the Individual Characteristics of Fired Bullets," Journal of Forensic Sciences, Vol. 4(1), January 1959, pp. 34-50.
1233. Biasotti, A. and Murdock, J. (1984). Criteria for Identification or State of the Art of Firearms and Toolmark Identification. AFTE Journal, Vol. 16, No. 4. pp 16-24
1234. Biasotti, A., (1981) Bullet Bearing Surface Composition and Rifling (Bore) Conditions as Variables in the Reproduction of Individual Characteristics on Fired Bullets Association of Firearm and Toolmark Examiners Journal , Vol. 13, No. 2, pp. 94-102.
1235. Biasotti, A., 1959 – A Statistical Study of the Individual Characteristics of Fired Bullets. Journal of Forensic Sciences. 1959 Jan; 4(1): 34-50.
1236. Biasotti, A., Murdock, J., and Moran, B. Chapter 35 "Firearms and Toolmark Identification," pp. 641-730 in Vol. 4, Modern Scientific Evidence: The Law and Science of Expert Testimony, 2011-2012 Edition (Faigman, DL, Blumenthal, JA, Sanders, J, Chen, EK, Mnookin, JK, and Murphy, EE.), Eagan, MN: Thompson-Reuters/West.
1237. Biasotti, A., Murdock, J., Chapter 23, Firearms and Toolmark Identification from Modern Scientific Evidence: The Law and Science of Expert Testimony, Vol. 2, West Pub. Co., 1997, pp. 124-155.
1238. Biasotti, A., Murdock, J., Moran, B., Firearms and Toolmark Identification. Chapter 35, Vol.4, pp 645-723 in Modern Scientific Evidence: The Law and Science of Expert Testimony (Faigman DL, Kay DK, Saks MJ, Sanders, J, Chen EK., eds, 2009-2010), St. Paul: Thompson-West.
1239. Biasotti, A., The Principles of Evidence Evaluation as Applied to Firearms and Tool Mark Identification, AFTE Journal, Volume 9, Number 4, October 1964.
1240. Biasotti, A.A. and Murdock, J.E., 1997. Firearms and toolmark identification: Legal issues and scientific status. Modern Scientific Evidence: The Law and Science of Expert Testimony, pp.124-151.
1241. Biasotti, A.A., (1959) A Statistical Study of the Individual Characteristics of Fired Bullets, Journal of Forensic Science, 4:1, pp. 34-50
1242. Biasotti, A.A., (1981) Rifling Methods – A Review and Assessment of the Individual Characteristics Produced., Association of Firearm and Toolmark Examiners Journal, Vol. 13, No. 3, pp. 34-61.
1243. Biasotti, A.A., Statistical Analysis of Bullet Comparison (Preliminary, Unpublished, Report for Masters Thesis), prepared for Criminology 299 course, University of California Berkeley, June 1, 1951.
1244. Biasotti, Alfred A. A Statistical Study of the Individual Characteristics of Fired Bullets. Journal of Forensic Sciences, vol. 4(1), January, 1959, pp. 34-50.
1245. Blackwell, R.J., and Framan E.P. (1980). Automated Firearms Identification System (AFIDS): Phase I. AFTE Journal, Vol. 12, No. 4. pp 11-37.
1246. Bokobza, L., Giverts, P., and Siso, R., 2014. Into the Breech Once Again - Family Characteristic Differences Between Glock and Smith and Wesson Pistols. AFTE Journal, 46(1), p. 80.
1247. Bolton-King, R., et al., "Numerical Classification of Curvilinear Structures for the Identification of Pistol Barrels," Forensic Science International, Issue 220, 2012, pp. 197-209.
1248. Bolton-King, R.S., 2015. Preventing miscarriages of justice: A review of forensic firearm identification. Science & Justice, 56(2), pp. 129-142.

1249. Bolton-King, R.S., Bencsik, M., Evans, J.P.O., Smith, C.L., Allsop, D.F., Painter, J.D. and Cranton, W.M., 2012. Numerical classification of curvilinear structures for the identification of pistol barrels. Forensic science international, 220(1), pp.197-209.
1250. Bolton-King, R.S., Evans, J.P.O., Smith, C.L., Painter, J.D., Allsop, D.F. and Cranton, W.M., 2010. What are the Prospects of 3D Profiling Systems Applied to Firearms and Toolmark Identification? AFTE Journal, 42(1), pp.23-33.
1251. Bolton-King, R.S., Jackson, A.R.W., 2014. Personal competency testing in firearms-related forensic disciplines: A UK study. CSEye 1.
1252. Bolton-King, Rachel S. et. al. (2010). What are the Prospects of 3D Profiling Systems Applied to Firearms and Toolmark Identification? AFTE Journal, Vol 42, No 1, 23 – 33.
1253. Bonfanti, M.S. and DeKinder, The Influence of Manufacturing Processes on the Identification of Bullets and Cartridge Cases- A Review of the Literature, Science and Justice, Volume 39, No. 1, 1999, pp. 3-10.
1254. Brackett, J. W. “A Study of Idealized Striated Marks and their Comparisons using Models.” Journal of the Forensic Science Society, vol. 10 (1), January, 1970, pp. 27-56.
1255. Braga, A. (2011). Reconsidering the Ballistic Imaging of Crime Bullets in Gun Law Enforcement Operations. Forensic Science Policy & Management: An International Journal, 2:3, 105-117.
1256. Braga, A., & Pierce, G. L. (2004, July 49:4). Linking Crime Guns: The Impact of Ballistics Imaging Technology on the Productivity of the Boston Police Department’s Ballistics Unit. Journal of Forensic Science.
1257. Brandt D., Metallurgy Fundamentals, Goodheart-Wilcox Company Inc., 1985
1258. Breeze, J., Masterson, L., Banfield, G., 2012. Outcomes from penetrating ballistic cervical injury. Journal of the Royal Army medical Corps, 158, pp.96-100.
1259. Brown, C., Bryant. W., “Consecutively Rifled Gun Barrels Present in Most Crime Labs.” AFTE Journal, Vol. 27, No. 3, July 1995, pp. 254-258.
1260. Brożek-Mucha, Z., 2014. Scanning electron microscopy and X-Ray microanalysis for chemical and morphological characterisation of the inorganic component of gunshot residue: selected problems. BioMed Research International.
1261. Brundage, D. J. “The Identification of Consecutively Rifled Gun Barrels.” AFTE Journal, vol. 30(3), Summer, 1998, pp. 438-444.
1262. Buckleton, J., et al. (2005). An Exploratory Bayesian Model for Firearm and Tool Mark Interpretation. AFTE Journal, Vol. 37, No. 4. pp 352-361.
1263. Bueno, J., Sikirzhytski, V., Lednev, I., 2013. Attenuated Total Reflectance-FT-IR Spectroscopy for Gunshot Residue Analysis: Potential for Ammunition Determination.
1264. Bueno, J., Sikirzhytski, V., Lednev, I.K., 2012. Raman spectroscopic analysis of gunshot residue offering great potential for caliber differentiation. Analytical Chemistry, 84(10), pp.4334-4339.
1265. Bunch, S. (et al). (2009). Is a Match Really a Match? A Primer on the Procedures and Validity of Firearm and Toolmark Identification. Forensic Science Communications, Vol. 11, No. 3. pp 1-10.
1266. Bunch, S. and Wevers, G., 2013. Application of likelihood ratios for firearm and toolmark analysis. Science & Justice, 53(2), pp.223-229.
1267. Bunch, S.G. and Murphy D.P.. A Comprehensive Validity Study for the Forensic Examination of Cartridge Cases. AFTE Journal, Vol. 35, No. 2, Spring 2003, pp. 201-203.
1268. Bunch, Stephen G. Consecutive Matching Striation Criteria: A General Critique. Journal of Forensic Sciences, vol. 45 (5), Sept. 2000, pp. 955-962.
1269. Burd, D. and Gilmore, A., (1968) Individual and Class Characteristics of Tools, Journal of Forensic Science, 13:3 pp. 390-396
1270. Burd, D. and Kirk, P. (1942). Tool Marks. Factors Involved in Their Comparison and Use as Evidence. Journal of Criminal Law and Criminology, Vol. 32, No. 6. pp 679-686.

1271. Burd, David Q. and Allen E. Gilmore. Individual and Class Characteristics of Tools. Journal of Forensic Sciences, Vol. 13 (3), July, 1968, pp. 390-396.
1272. Burrard, G, The Identification of Firearms and Forensic Ballistics, Butler & Tanner 1934, Reprinted Barnes & Company 1962 and Wolfe publishing 1990
1273. Burrard, G., (1934) The Identification of Firearms and Forensic Ballistics, Herbert Jenkins, Ltd., London, England
1274. Butcher, S. and D. Pugh. A Study of Marks made by Bolt Cutters. Journal of the Forensic Science Society, Vol. 15 (2), April 1975, pp. 115-126.
1275. Buxton, J., The Science of Ballistics: Judicial Applications, American Journal of Police Sciences, May – June, 1931, 2(3): 211-219
1276. Cassidy, F., “Examination of Toolmarks from Sequentially Manufactured Tongue and Groove Pliers.” Journal of Forensic Sciences, vol. 25 (4), Oct., 1980, pp. 796-809.
1277. Castro, C.E., Norris, S.A., Setume, B.K. and Hamby, J.E., 2014. The examination, evaluation, and identification of 40 S&W calibre cartridge cases fired from 1079 different GLOCK semiautomatic pistols manufactured over a six-year period. Canadian Society of Forensic Science Journal, 47(2), pp.65-73.
1278. Cazes, M. and Goudeau, J., 2013. Validation Study Results from Hi-Point Consecutively Manufactured Slides. AFTE Journal, 45(2), pp. 175-177.
1279. Cecchetto, G., Giraudo, C., Amagliani, A., Viel, G., Fais, P., Cavarzeran, F., Feltrin, G., Ferrara, S.D., Montisci, M., 2011. Estimation of the firing distance through micro-CT analysis of gunshot wounds. International Journal of Legal Medicine, 125(2), pp.245-251.
1280. Ceto, X., O’Mahony, A.M., Samek, I.A., Windmiller, J.R., del Valle, M., Wang, J., 2012. Rapid field identification of subjects involved in firearm-related crimes based on electroanalysis coupled with advanced chemometric data treatment. Anal Chem, 84(23), pp. 10306-14.
1281. Champod, C., et al. (2003). Firearm and Tool Marks Identification: The Bayesian Approach. AFTE Journal, Vol. 35, No. 3. pp 307-316.
1282. Chang, K.H., Jayaprakash, P.T., Yew, C.H., Abdullah, A.F.L., 2013. Gunshot residue analysis and its evidential values: a review. Australian Journal of Forensic Sciences, 45(1), pp 3–23.
1283. Chew, Wei et al (2010). Striation Density for Predicting The Identifiability of Fired Bullets With Automated Inspection Systems. Journal of Forensic Sciences, Vol. 55, No. 5, 1222-1226.
1284. Christensen AM, Sylvester AD., Physical Matches of Bone, Shell and Tooth Fragments: A Validation Study. Journal of Forensic Sciences, 2008;53, Pp.694-698
1285. Chu, et al, “Automatic Identification of Bullet Signatures Based on Consecutive Matching Striae (CMS) Criteria,” Forensic Science International, 231, 2013, Pp. 137-141.
1286. Chu, Tong and Song, “Validation Tests for the Congruent Matching Cells (CMC) Method Using Cartridge Cases Fired with Consecutively Manufactured Pistol Slides,” AFTE Journal, Volume 45, Number 4, Fall 2013, pp. 361-366.
1287. Chu, W., et al, “Selecting Valid Correlation Areas for Automated Bullet Identification System Based on Striation Detection,” Journal of Research of the National Institute of Standards and Technology, Volume 116, Number 3, May-June 2011.
1288. Chu, W., Song, J., Vorburger, T. and Ballou, S., 2010. Striation density for predicting the identifiability of fired bullets with automated inspection systems.Journal of forensic sciences, 55(5), pp.1222-1226
1289. Chu, W., Song, J., Vorburger, T., Yen, J., Ballou, S. and Bachrach, B., 2010. Pilot study of automated bullet signature identification based on topography measurements and correlations. Journal of forensic sciences, 55(2), pp.341-347.
1290. Chu, W., Song, J., Vorburger, T.V., Thompson, R. and Silver, R., 2011. Selecting valid correlation areas for automated bullet identification system based on striation detection. Journal of Research of the National Institute of Standards and Technology, 116(3), p.647.

1291. Chu, W., Thompson, R.M., Song, J. and Vorburger, T.V., 2013. Automatic identification of bullet signatures based on consecutive matching striae (CMS) criteria. Forensic science international, 231(1), pp.137-141.
1292. Chu, W., Tong, M. and Song, J., 2013. Validation tests for the congruent matching cells (CMC) method using cartridge cases fired with consecutively manufactured pistol slides. AFTE Journal, 45(4), pp.361-366.
1293. Chumbley, L.S., Morris, M.D., Kreiser, M.J., Fisher, C., Craft, J., Genalo, L.J., Davis, S., Faden, D. and Kidd, J., 2010. Validation of tool mark comparisons obtained using a quantitative, comparative, statistical algorithm. Journal of forensic sciences, 55(4), pp.953-961.
1294. Chumbley, S. and Morris, M., "Significance of Association in Tool Mark Characteristics," Department of Justice (DOJ) Grant 2009-DN-R-119, Document 243319, August 2013 (Ames Laboratory)
1295. Claytor D., "Validation of Fracture Matching Trough the Microscopic Examination of the Fractured Surfaces of Hacksaw Blades," AFTE Journal, Vol. 42(4), Fall 2010, pp. 323-334.
1296. Clow, Charles M. Cartilage Stabbing with Consecutively Manufactured Knives: A Response to Ramirez v. State of Florida. AFTE Journal, vol. 37 (2), Spring, 2005, pp. 86-116.
1297. Coffman, B. C., "Computer Numerical Control (CNC) Production Tooling and Repeatable Characteristics on Ten Remington Model 870 Production Run Breech Bolts," AFTE Journal, Volume 35, Number 1, Winter 2003, pp. 49-54.
1298. Collins, E. and Stone, R.S., 2005. How unique are impressed toolmarks? An empircal study of 20 work hammer faces. AFTE Journal, 37(4), pp.252-295.
1299. Coody, A. C., "Consecutively Manufactured Ruger P-89 Slides," AFTE Journal, Volume 35, Number 2, Spring 2003, pp. 157-160.
1300. Davis, J., (1958) An Introduction to Tool Marks, Firearms and the Striagraph, Charles C. Thomas Publishing Co., Springfield, IL
1301. De Ceuster, J., Hermsen, R., Mastaglio, M., Nennstiel, R., 2012. A discussion on the usefulness of a shared European ballistic image database. Science and Justice, 52(4), pp.237-242.
1302. De Forest, P. Gaensslen, R and Lee, H., (1983) Forensic Science-An Introduction to Criminalistics, McGraw-Hill Publishing Co.
1303. De Garmo, E.P., Black, J.T., Kohser, R.A., Materials & Processing in Manufacturing, MacMillian Publishing Co., 7th Edition, 1988
1304. De Garmo, E.P., Materials and Processes in Manufacturing, The MacMillian Co., 3rd Edition, 1969
1305. De Kinder, J., Tulleners, F., Thiebaut, H. (2004), Reference Ballistic Imaging Database Performance, Forensic Science International, 140, pp. 207-215
1306. De Kinder, Jan and Bonfanti, Monica. (1999). Automated Comparisons of Bullet Striations Based on 3D Topography. Forensic Science International, Vol 101. pp 85-93.
1307. De Kinder, Jan, et al. (1998). Surface Topology of Bullet Striations: An Innovating Technique. AFTE Journal, Vol. 30, No. 2. pp 294-299.
1308. De Kinder, Jan. (2002). Ballistic Fingerprinting Databases. Science & Justice, Vol 42, No. 4. pp 197-203
1309. DeFrance, Charles S. and Michael VanArsdale. Validation Study of Electrochemical Rifling. AFTE Journal, vol. 35 (1), Winter, 2003, pp. 35-37.
1310. Deinet, W. and Katterwe, H., 2007. Comments on the Application of Theoretical Probability Models including Bayes Theorem in Forensic Science Relating Firearm and Tool Marks. AFTE Journal, 39(1), p.4.
1311. Deinet, W., "Studies of Models of Striated Marks Generated by Random Processes." Journal of Forensic Sciences, vol. 26 (1), Jan., 1981, pp. 35-50.
1312. Deinet, W., et al. (2007). Comments on the Application of Theoretical Probablity Models including Bayes Theorem in Forensic Science Relating Firearm and Tool Marks, AFTE Journal, Vol. 39, No. 1. Pp 4-7.

1313. Demoli, N. et al. (2004). Toolmarks Identification using SEM Images in an Optoelectronic Correlator Device. Optik, Vol 115, No. 11, pp. 487-492.
1314. Deschenes, M., et al. (1995). Statistics and Tool Marks Comparisons. AFTE Journal, Vol. 27, No. 2. pp 140-141.
1315. Doelling, B., Comparison of 4000 Consecutively Fired Steel Jacketed Bullets, Abstract B58, p. 53 from Proceedings of the AAFS Annual Meeting, Seattle, WA, February 19 -24, 2001
1316. Dongguang, L. (2006). Ballistics Projectile Image Analysis for Firearm Identification. IEEE Transactions on Image Processing, Vol 15, No. 10, 2857-2865.
1317. Dongguang, L. (2009). Ballistics Image Processing and Analysis for Firearms Identification. Image Processing. Chapter 9, pp 141-174. ISBN: 978-953-307-026-1.
1318. Dutton, G. (1998) The Importance of Being Impartial. AFTE Journal 30(3): 523-526.
1319. Dutton, G., 2014. Book Review: The Forensic Examination and Interpretation of Tool Marks, by David Baldwin, John Birkett, Owen Facey & Gilleon Rabey. AFTE Journal, 46(2), pp. 102-103.
1320. DuVall J.B., Contemporary Manufacturing Processes, Goodheart-Wilcox Co., Inc., 1996
1321. Eckerman, S. J., “A Study of Consecutively Manufactured Chisels.” AFTE Journal, vol. 34 (4), Fall 2002, pp. 379-390.
1322. Ekstrand, et al, “Virtual Tool Mark Generation for Efficient Striation Analysis,” Journal of Forensic Sciences, Volume 59(4), 2014, pp. 950-959.
1323. Ekstrand, L., Zhang, S., Grieve, T., Chumbley, L.S. and Kreiser, M.J., 2014. Virtual tool mark generation for efficient striation analysis. Journal of forensic sciences, 59(4), pp.950-959.
1324. Ernst and Merchant, Chip Formation, Friction and Finish, The Cincinnati Milling Co., Cincinnati, Ohio
1325. Evans, Paul & Smith, Clifton. (2004). Validation of the Linescan Imaging Technique for Imaging Cylindrical Forensic Ballistics Specimens. AFTE Journal, Vol 36, No 4. pp 275-280.
1326. Faden, D. (et al.), Statistical Confirmation of Empirical Observations, AFTE Journal, Volume 39, Number 3, Summer 2007, 211-220
1327. Fadul T.G., Hernandez G.A., Stoiloff S., Gulati S., 2012. An empirical study to improve the scientific foundation of forensic firearm and tool mark identification utilizing 10 consecutively manufactured slides. NIJ Project Report, 45(4), pp.376-393.
1328. Fadul, T. et al. An Empirical Study to Improve the Scientific Foundation of Forensic Firearm and Tool Mark Identification Utilizing Consecutively Manufactured EBIS Barrels with the same EBIS Pattern, National Institute of Justice, Award No. 2010-DN-BX-K269 (2013).
1329. Fadul, T. G., “An Empirical Study to Evaluate the Repeatability and Uniqueness of Striations/Impressions Imparted on Consecutively Manufactured Glock EBIS Gun Barrels,” AFTE Journal, Volume 43, Number 1, Winter 2011, Pp. 37-44.
1330. Fadul, T. G., et al, “An Empirical Study to Evaluate the Repeatability and Uniqueness of Striations / Impressions in Fired Cartridge Casings Fired in 10 Consecutively Manufactured Slides,” National Institute of Justice, Office of Justice Programs, US Department of Justice Project Award No. 2009-DN-BX-K230.
1331. FBI, Firearms Identification, U.S. Government Printing Office, 1941, pp 17 – 33 Development and Admissibility of Ballistics and Firearms Evidence.
1332. Flynn, Emmett M. Toolmark Identification. Journal of Forensic Sciences, vol. 2 (1), Jan., 1957, pp. 95-106.
1333. Forensic Technology Center of Excellence. Forensic Optical Topography Working Group Meeting: Final Report. National Institute of Justice. Washington. April 17, 2015.
1334. Forensic Technology Center of Excellence. Performance Evaluation and Utility Assessment of Magneto-Optical Sensor Technology for Detecting and Visualizing Obliterated Serial Numbers in Firearms. Rockville, MD: National Institute of Justice, 2014. National Criminal Justice Reference Service.

1335. Freeman, R. A., “Consecutively Rifled Polygon Barrels,” AFTE Journal, vol.10 (2), June 1978, pp.40-42.
1336. Freitas, J.C., Sarkis, J.E., Negrini Neto, O., Viebig, S.B., 2012. Identification of gunshot residues in fabric targets using sector field inductively coupled plasma mass spectrometry technique and ternary graphs. Journal of Forensic Science, 57(2): 503-508.
1337. Gallidabino, M., Weyermann, C., Romolo, F.S., Taroni, F., 2013. Estimating the time since discharge of spent cartridges: A logical approach for interpreting the evidence. Science and Justice, 53(1), pp.41-48.
1338. Gambino, C., McLaughlin, P., Kuo, L., Kammerman, F., Shenkin, P., Diaczuk, P., Petraco, N., Hamby, J. and Petraco, N.D., 2011. Forensic surface metrology: tool mark evidence. Scanning, 33(5), pp.272-278.
1339. Gauriot, R., Guanaratnam, L., Moroni, R., Reinikainen, T., Corander, J., 2013. Statistical challenges in the quantification of gunshot residue evidence. Journal of Forensic Science, 58(5), pp.1149-1155.
1340. George, W. (2004). The Validation of the Brasscatcher Portion of the NIBIN/IBIS System Part Two: Fingerprinting Firearms Reality or Fantasy. AFTE Journal, Vol. 36, No. 4. pp 289-296.
1341. Geradts, Z. et al. (1999). Pattern Recognition in a Database of Cartridge Cases. SPIE Proceedings: Investigation and Forensic Science Technologies, Vol. 3576. pp 104-115.
1342. Geradts, Zeno, et al. (1994). A New Approach to Automatic Comparison of Striation Marks. Journal of Forensic Sciences, Vol. 39, No 4, pp. 974-980.
1343. Geradts, Zeno, et al. (2001). Pilot Investigation of Automatic Comparison of Striation Marks with Structured Light. SPIE Proceedings Paper, Vol 4232. pp 49-56
1344. Gerules, G., Bhatia, S., Jackson, D., 2013. A survey of image processing techniques and statistics for ballistic specimens in forensic sciences. Science & Justice, 53(2), pp.236-250.
1345. Gianelli, P. (2007). Confirmation Bias. Criminal Justice, Vol. 22. pp 60-61.
1346. Gilchrist, E., Smith, N., Barron, L., 2012. Probing gunshot residue, sweat and latent human fingerprints with capillary-scale ion chromatography and suppressed conductivity detection. Analyst, 137(7), pp.1576-1583.
1347. Giroux B. N., “Empirical and Validity Study: Consecutively Manufactured Screwdrivers,” AFTE Journal, Volume 41, Number 2, Spring 2009, pp. 153-158.
1348. Giverts P., Springer E., and Argaman U., Using the IBIS for the Examination of Bullets Fired from Polygonally Barreled Guns Such as the Glock Pistol, AFTE Journal, Volume 36, Number 3, Summer 2004, pp 226-229.
1349. Goddard, C. A History of Firearm Identification, AFTE Journal. Vol. 17, No. 1, 1985, pp. 55 – 68 (Originally printed in Chicago Police Journal, 1936).
1350. Goddard, C., A History of Firearms Identification to 1930. AFTE Journal, Vol. 31, No. 3, 1999, pp. 225 – 241.
1351. Goddard, C.H., Scientific Identification of Firearms and Bullets, Journal of Criminal Law and Criminology, Vol. 16, No. 2, August 1926, pp 254-263.
1352. Goddard, Waite, Fisher and Gravelle, Army Ordnance, November & December 1925
1353. Gouwe J., Hamby J. E., Norris, S., “Comparison of 10,000 Consecutively Fired Cartridge Cases from a Model 22 Glock .40 S&W Caliber Semiautomatic Pistol,” AFTE Journal, Volume 40, Number 1, Winter 2008, pp. 57-63.
1354. Grieve, T., “Objective Analysis of Toolmarks in Forensics,” Graduate Thesis and Dissertations, Paper 13014, 2013, Iowa State University
1355. Grieve, T., Chumbley, L.S., Kreiser, J., Morris, M., Ekstrand, L. and Zhang, S., 2014. Objective Comparison of Toolmarks from the Cutting Surfaces of Slip-Joint Pliers. AFTE Journal, 46(2), p.176.
1356. Grima, M., Butler, M., Hanson, R., Mohameden, A., 2012. Firework displays as sources of particles similar to gunshot residue. Science and Justice, 52(1), pp.49-57.
1357. Grom, T.L. and Demuth, W.E., 2012. IBIS correlation results of cartridge cases collected over the course of 500 firings from a Glock pistol. AFTE Journal, 44(4), pp.361-363.
1358. Grooss, Klaus Dieter. The Hammer-Murderer. AFTE Journal, vol. 27 (1), 1995, pp. 27-30.

1359. Grzybowski, R., Miller, J., Moran, B., Murdock, J., Nichols, R. and Thompson, R., 2003. Firearm/toolmark identification: passing the reliability test under federal and state evidentiary standards. AFTE Journal, 35(2), pp.209-221.
1360. Gunther J.D., and Gunther C.O, "The Identification of Firearms," Wiley & Sons, Inc. 1935. pp 33-36.
1361. Gunther, C. O. (1930). Markings on Bullets and Shells Fired from Small Arms. Mechanical Engineering, Vol. 52. pp 107-118 and 1065-1069.
1362. Gunther, C. O. (1932). Markings on Bullets and Shells Fired from Small Arms. Mechanical Engineering, Vol. 54. pp 341-345.
1363. Gunther, C.O. (1932). Principles of Firearms Identification: Fingerprinting Ordnance in the War on Crime. Army Ordnance, Vol. 12. pp 339-340.
1364. Gunther, C.O. (1932). Principles of Firearms Identification: Further Analysis of Accidentical Characteristics. Army Ordnance, Vol. 13. pp 40-43.
1365. Gunther, J., (1935) The Identification of Firearms, John Wiley, New York
1366. Gunther, J.D., and Gunther C.O, The Identification of Firearms, Wiley & Sons, Inc. 1935.
1367. Gutowski, S., 2005. Error rates in the identification sciences. Forensic Bulletin, 23, pp.23-29.
1368. Haag, L., (2007) The Matching of Cast Bullets to the Moulds that Made Them, AFTE Journal, 39:4 pp. 313-322
1369. Hall, E. "Bullet Markings from Consecutively Rifled Shilen DGA Barrels." AFTE Journal, vol. 15(1), Jan., 1983, pp. 33-53.
1370. Hall, J., "Consecutive cuts made by bolt cutters and their effect on identification." AFTE Journal, vol. 24 (3), July, 1992, pp. 260-272.
1371. Hamby J. E., Brundage D. J. , Thorpe J. W., "The Identification of Bullets Fired from 10 Consecutively Rifled 9mm Ruger Pistol Barrels: A Research Project Involving 507 Participants from 20 Countries," AFTE Journal, Volume 41, Number 2, Spring 2009, pp. 99-110.
1372. Hamby J., and Thorpe J., "The Examination, Evaluation and Identification of 9mm Cartridge Cases Fired from 617 Different GLOCK Model 17 & 10 Semiautomatic Pistols," AFTE Journal, Volume 41(4), Fall 2009, Pp. 310-324.
1373. Hamby, J, et al, 2015. The Identification of Bullets Fired From 10 Consecutively Rifled 9MM RUGER Pistol Barrels – A Research Project Involving 619 Participants from 23 Countries Using Optical Comparison Microscopy and 'Ballistics' Imaging Instrumentation with an Analysis of Possible Error Rate Using Bayesian Statistics. Journal of Forensic Sciences (In Press).
1374. Hamby, J. Identification of Projectiles. AFTE Journal, Vol. 6, No. 5/6, Fall 1974, pp 22-24
1375. Hamby, J., and Thorpe, J., The Examination, Evaluation and Identification of 9mm Caliber Cartridge Cases From 617 Model 17 & 19 Semiautomatic Pistols," Association of Firearm and Toolmark Examiners Journal, Vol. 41, No. 4, Fall 2005, pp.310-324.
1376. Hamby, J., The History of Firearm and Toolmark Identification, AFTE Journal, Vol. 31, No. 3, 1999, pp. 266-284.
1377. Hamby, J.E., 2010. The examination of bullets fired from 10 consecutively manufactured 9mm barrels—A project involving 502 participants from 20 countries. Science & Justice, 50(1), p.30.
1378. Hamby, J.E., et al. Error Rates and Random Match Probabilities Based on the 10-barrel Test and the GLOCK Cartridge Case Test, presentation at the AFTE Conference, Seattle 2014, paper submitted for publication under peer review.
1379. Hamby, J.E., Norris, S. and Petraco, N.D., 2016. Evaluation of Glock 9 mm firing pin aperture shear mark individuality based on 1,632 different pistols by traditional pattern matching and IBIS pattern recognition. Journal of forensic sciences, 61(1), pp.170-176.
1380. Hatcher Jury & Weller Hatcher, J.S., Jury, F.J. and Weller, J., Firearm Investigation Identification and Evidence, The Stackpole Company, 1957.

1381. Hatcher, J., (1935) Textbook of Firearms Investigation, Identification and Evidence, Small-Arms Technical Publishing Co., Plantersville, SC
1382. Heard, B. J., Handbook of Firearms and Ballistics, Wiley & Sons, 1997, pp. 136-141
1383. Heard, B.J., 2011. Handbook of firearms and ballistics: examining and interpreting forensic evidence (Vol. 1). John Wiley & Sons.
1384. Heikkinen, V., Kassamakov, I., Barbeau, C., Lehto, S., Kiljunen, J., Reinikainen, T., and Haggstrom, E., 2013. Quantitative High-Resolution 3D Microscopy Improves Confidence When Determining the Order of Creation of Toolmarks. AFTE Journal, 45(2), pp. 150-159.
1385. Hodge, E. (1988). Guarding Against Error. AFTE Journal, Vol. 20, No. 3. pp 290-293.
1386. Hornsby, B. MCC Bolt Cutters. AFTE Journal, vol. 21 (3), July, 1989, p. 508.
1387. Howitt D., Tulleners F., "A Calculation of the Theoretical Significance of Matched Bullets," Journal of Forensic Sciences, Volume 53, Number 4, July 2008, Pp.868-875.
1388. Hu, J., Chou, K., (2007) Characterizations of cutting tool flank wear-land contact, Wear, 263 pp. 1454-1458.
1389. Hunsinger, M., 2013. Metal Injection Molded Strikers and Extractors in a Smith & Wesson Model M&P Pistol. AFTE Journal, 45(1), p. 21.
1390. Hurd D., Silver M., Bacher A.B., & McLaughlin C.W., Physical Science, Prentice-Hall, New Edition, 1993
1391. IAI Firearms Sub-Committee - Stanton O. Berg, Chairman, The History of Firearms Identification, Identification News, June 1965, pp. 5 – 15.
1392. Inbau, F., Scientific Evidence in Criminal Cases (Firearms Identification – Ballistics), AFTE Journal, Vol. 13, No. 2, 1981: 281 (Originally appeared in Journal of Police Science, 1933)
1393. Intelligent Automation, Incorporated (October, 2010). A Statistical Validation of the Individuality of Guns Using High Resolution Topographical Images of Bullets. National Institute of Justice Grant #2006-DN-BX-K030.
1394. Jacque-Mann, M. and Espinoza, E. (1992). Firearms Examination by Scanning Electron Microscopy: Observations and an Update on Current and Future Approaches. AFTE Journal, Vol. 24, No. 3. pp 294-303.
1395. Jones, B.C., Press, M., and Guerci, J.R. (1998). Decision Fusion Based Automated Drill Bit Correlator. SPIE Conference on Investigation and Forensic Science Technologies: SPIE, Vol. 3576. pp 253-263.
1396. Jordan, T., “Individual Characteristics on Copper Insulated Wire.” AFTE Journal, vol. 14 (1), 1982, pp. 53-56.
1397. Katterwe, H "Modern Approaches for the Examination of Toolmarks and Other Surfaces,” Forensic Science Review, Volume. 8, Number. 1, Pp. 46-71, June 1996
1398. Katterwe, H. W., “Fracture Matching and Repetitive Experiments: A Contribution of Validation,” AFTE Journal vol. 37 (3), Summer 2005, pp. 229-241.
1399. Kaye, D. (2010). Probability and Individuality in Forensic Science Evidence. Brooklyn Law Review, Vol. 75, No. 4, pp. 1163-1185
1400. Kellett, PM, Individualization: Principles and Procedures in Criminalistics Laboratory Director, San Bernardino County Sheriff's Department, CA
1401. Kennington, R., “Identification of Cartridge Cases Fired in Different Firearms: ‘Pre-Identified Cartridges.’” AFTE Journal, vol. 31(1), 1999, pp. 15-19.
1402. Kerkhoff, W., Stoel, R.D., Berger, C.E.H., Mattijssen, E.J.A.T., Hermsen, R., Smits, N. and Hardy, H.J.J., 2015. Design and results of an exploratory double blind testing program in firearms examination. Science & Justice,55(6), pp.514-519.
1403. Kerkhoff, W., Stoel, R.D., Mattijssen, E.J.A.T. and Hermsen, R., 2013. The likelihood ratio approach in cartridge case and bullet comparison. Assoc Firearm Toolmark Examiners J, 45(3), pp.284-290.
1404. Kersthol J et al. “Does Suggestive Information Cause A Confirmation Bias in Bullet Comparisons” Forensic Sci Int, 2010 (1-3) pp. 138-42.

1405. King, E., "Validation Study of Computer Numerical Control (CNC) Consecutively Manufactured Screwdrivers," AFTE Journal, Volume 47(3), Summer 2015, pp. 171-176.
1406. Kirby, S., (1983) Comparison of 900 Consecutively Fired Bullets and Cartridge Cases From a .455 Caliber S&W Revolver, AFTE Journal, 15:3, pp. 113-126
1407. Kirk, P. and Kingston, C. (1964). Evidence Evaluation and Problems in General Criminalistics. Journal of Forensic Sciences, Vol. 9, No. 4. Pp 434-444.
1408. Kong, Jun, et al. (2003). A Firearm Identification System Based on Neural Network. AI 2003: Advances in Artificial Intelligence; Lecture Notes in Computer Science, Vol. 2903, pp.315-326.
1409. Kong, Jun, et al. (2004). An Automatic Analysis System for Firearm Identification Based on Ballistics Projectiles. Rough Sets and Current Trends in Computing; Lecture Notes in Computer Science, Vol 3066, Pp. 653-658.
1410. Koshy, P., Dewes, R.C., Aspinwall, D.K., (2002) High speed end milling of hardened ASI D2 tool steel, Journal of Materials Processing Technology**,** 127 pp. 266-273.
1411. Kou, Chenyuan and Tung, Cheng-Tan. (1994). FISOFM: Firearms Identification Based on SOFM Model of Neural Network. Proceedings – Institute of Electrical and Electronics Engineers – 28th Annual International Carnahan Conference on Security Technology. pp 120-125.
1412. Kraft, B., Critical Review of Forensic Ballistics – Part I, American Journal of Police Science, Jan-Feb 1931, 2(1), pp. 52 – 66.
1413. Kraft, B., Critical Review of Forensic Ballistics – Part II, American Journal of Police Science, Mar – Apr, 1931, 2(2), pp. 125 – 142.
1414. La Porte, D., "An Empirical Validation Study of Breechface Marks on .380 ACP Caliber Cartridge Cases Fired from Ten Consecutively Finished Hi-Point Model C9 Pistols," AFTE Journal, Volume 43, Number 4, Fall 2011.
1415. LaPorte, D., 2011. An empirical and validation study of breechface marks on. 380 ACP caliber cartridge cases fired from ten consecutively finished Hi-Point C9 pistols. AFTE Journal, 43(4), pp.303-309.
1416. Lardizabal, P. Cartridge Case Study of the HK USP. AFTE Journal, vol. 27 (1), Jan., 1995, pp. 49-51.
1417. Lee, H.C., Se, M., Meng, H.H., 2011. Forensic examination of fired bullets and cartridge cases of 9mm Luger imitation ammunition. Forenscie Science Journal, 10(1), pp. 11—18
1418. Lee, S. E., "Examination of Consecutively Manufactured Slotted Screwdrivers." AFTE Journal, vol. 35 (1), Winter, 2003, pp. 66-70.
1419. Leng, J. and Huang, Z., 2012. On analysis of circle moments and texture features for cartridge images recognition. Expert Systems with Applications, 39(2), pp.2092-2101.
1420. Leng, J., Huang, Z. and Li, D., 2010. Features extraction and classification of cartridge images for ballistics identification. In Trends in Applied Intelligent Systems, pp. 331-340.
1421. Leon, Fernando. (2006). Automated Comparison of Firearm Bullets. Forensic Science International, Vol 156. pp 40-50.
1422. Li, D., 2010. A Novel Ballistics Imaging System for Firearm Identification. In Technological Developments in Networking, Education and Automation, Springer Netherlands. pp. 327-331.
1423. Li, D., 2010. A Novel Binarization Algorithm for Ballistics Firearm Identification. In Innovations in Computing Sciences and Software Engineering, Springer Netherlands. pp. 421-425.
1424. Lightstone, L., "The Potential for and Persistence of Subclass Characteristics on the Breech Faces of SW40VE Smith & Wesson Sigma Pistols," AFTE Journal, Volume 42(4), Fall 2010, pp. 308-322.
1425. Lightstone, L., 2010. The potential for and persistence of subclass characteristics. AFTE Journal, 42(4), pp.308-322.
1426. Lilien, R. et al, "Applied Research and Development of a Three-Dimensional Topography System for Imaging and Analysis of Striated and Impressed Tool Marks for Firearm Identification using GelSight"
1427. Lindström, A.C., Hoogewerff, J., Athens, J., Obertova, Z., Duncan, W., Waddell, N., Kieser, J., 2015. Gunshot residue preservation in seawater. Forensic Science International, 253, pp.103-111.

1428. Lomoro, V. J., “Class Characteristics of 32 SWL, FIE Titanic Revolvers.” AFTE Journal, vol. 6 (2), 1974, pp. 18-21.
1429. Lopez, L. and Grew, S., (2000) Consecutively Machined Ruger Bolt Faces, AFTE Journal, 32:1 pp. 19-24
1430. Lopez-Lopez, M., Delgado, J.J., Garcia-Ruiz, C., 2012. Ammunition identification by means of the organic analysis of gunshot residues using raman spectroscopy. Analytical Chemistry, 84(8), pp.3581-3585.
1431. López-López, M., Fernández de la Ossa M.Á., García-Ruiz. C., 2015. Fast analysis of complete macroscopic gunshot residues on substrates using raman imaging. Applied Spectroscopy, 69(7), pp.889-893.
1432. Love, J.C., Derrick, S.M. and Wiersema, J.M., 2013. Independent Validation Test of Microscopic Saw Mark Analysis. NIJ Award #2010-DN-BX-K325.
1433. Lutz, M. Consecutive Revolver Barrels. AFTE Newsletter #9, Aug., 1970, pp.24-28.
1434. Lux, C., Schyma, C., Madea, B., Courts, C., 2014. Identification of gunshots to the head by detection of RNA in backspatter primarily expressed in brain tissue. Forensic Science Internation, 237, pp.62-69
1435. Lyons, D. J., “The Identification of Consecutively Manufactured Extractors,” AFTE Journal, Volume 41, Number 3, Summer, 2009, pp.246-256.
1436. Ma, L., Song, J., Whitenton, E., Zheng, A., Vorburger, T. and Zhou, J., 2004. NIST bullet signature measurement system for RM (Reference Material) 8240 standard bullets. Journal of forensic sciences, 49(4), pp.649-659.
1437. Maiden, N., Hiss, J., Gips, H., Hocherman, G., Levin, N., Kosachevsky, O., Vinokurov, A., Zelkowicz, A., Byard, R., 2015. An Analysis of the Characteristics of Thoracic and Abdominal Injuries Due to Gunshot Homicides in Israel. Journal of Forensic Sciences, 61(1), pp.87-92
1438. Matthews, J. Howard. Firearms Identification: Volume I, II, and III, University of Wisconsin Press 1962.
1439. Matty, W., (1985) A Comparison of Three Individual Barrels Produced From One Button Rifled Barrel Blank, AFTE Journal,17:3, pp. 64-69
1440. Matty, W., “Raven .25 Automatic Pistol Breech Face Tool Marks.” AFTE Journal, vol. 16 (3), 1984, pp. 57-60.
1441. Matty, William and Torrey Johnson. A Comparison of Manufacturing Marks on Smith & Wesson Firing Pins. Journal of AFTE, vol. 16 (3), 1984, pp. 51-56.
1442. Matty, William. A Comparison of Three Individual Barrels Produced from One Button-Rifled Barrel Blank. AFTE Journal, vol. 17(3), July, 1985, pp. 64-69.
1443. May L., “Identification of Knives, Tools and Instruments” Journal of Police Science (no volume or number listed) 1930, pp. 247-248.
1444. Mayland and Tucker, “Validation of Obturation Marks in consecutively Reamed Chambers,” AFTE Journal, Volume 44, No. 2, Spring, 2012, pp.167-169.
1445. Mayland, B., and Tucker, C., 2012. Validation of Obturation Marks in Consecutively Reamed Chambers. AFTE Journal, 44(2), pp. 167-169.
1446. McCarthy WJ and Smith R.E., Machine Tool Technology, McKnight & McKnight Publishing, 1968
1447. McClarin, D., “Adding an Objective Component to Routine Casework: Use of Confocal Microscopy for the Analysis of 9mm Caliber Bullets,” AFTE Journal, Volume 47(3), Summer 2015, pp. 161-170.
1448. Md Ghani, N.A., Liong, C.Y., Jemain, A.A., 2010. Analysis of geometric moments as features for firearm identification. Forensic Science International, 198(1-3), pp. 143-149.
1449. Melo Lucena, M.A., de Sa., G.F., Rodriques, M.O., Alves, S., Talhavini, M., Weber, I.T., 2012. $ZnAl_2O_4$-based luminescent marker for gunshot residue identification and ammunition traceability, Analytic Methods, 5, pp.705-709.
1450. Meyers, C. (2002). Some Basic Bullet Striae Considerations. AFTE Journal, Vol. 34, No. 2, pp 158-160.
1451. Mezger, 0., Heess, W., Hasslacher, F., (1931) Determination of the Type of Pistol Employed from an Examination of Fired Bullets and Shells," Am. J. Police Science 2:6 pp. 473-500 (1932) 3:2 pp. 124-146

1452. Mikko, D., and Miller, J., 2013. An Empirical Study/Validation Test Pertaining to the Reproducibility of Toolmarks on 20,000 Bullets Fired Through M240 Machine Gun Barrels. AFTE Journal, 45(3), pp. 290-291.
1453. Mikko, D., Miller, J. and Flater, J., 2012. Reproducibility of toolmarks on 20,000 bullets fired through an M240 machine gun barrel. AFTE J, 44(3), pp.248-53.
1454. Miller J. and Neel M., Criteria for Identification of Toolmarks, Part III, AFTE Journal, Vol. 36, No. 1, Winter 2004, pp. 7-38.
1455. Miller J., and McLean M., Criteria for Identification of Toolmarks, AFTE Journal, Vol. 30, No. 1, Winter 1998, pp. 15-61.
1456. Miller J., Criteria for Identification of Toolmarks, Part II, AFTE Journal, Vol. 32, No. 2, Spring 2000, pp. 116-131.
1457. Miller, J. (1998) Reproducibility of Impressed and Striated Tool Marks:4d Cut Flooring Nails, AFTE Journal, 30:4 pp. 631-638
1458. Miller, J. (2000). Criteria for Identification of Toolmarks, Part II: Single Land Impression Comparisons. AFTE Journal, vol. 32 (2), Pp.116-131.
1459. Miller, J. (2001) An Introduction to the Forensic Examination of Tool Marks, AFTE Journal, 33:3 pp. 233-248
1460. Miller, J. (2001). An Examination of the Application of the Conservative Criteria for Identification of Striated Toolmarks Using Bullets Fired from Ten Consecutively Rifled Barrels. AFTE Journal, Vol. 33, No. 2. pp 125-132.
1461. Miller, J., (2000) An Examination of Two Consecutively Rifled Barrels and A Review of the Literature, AFTE Journal, 32:3, pp. 259-270.
1462. Miller, J., “Cut Nail Manufacturing and Toolmark Identification.” AFTE Journal, vol. 30 (3), Summer 1998, pp. 492-498.
1463. Miller, J., Kong, H., “Metal Fractures: Matching and Non-Matching Patterns,” AFTE Journal, vol. 38 (2), Spring 2006, pp. 133-165.
1464. Miller, Jerry and G. Beach, Toolmarks: Examining the Possibility of Subclass Characteristics, AFTE Journal, Vol. 37 (4), Fall 2005, pp. 296-345.
1465. Minimum Qualifications for Firearm and Toolmark Examiner Trainees (4/20/2006). Scientific Working Group for Firearms and Toolmarks.
1466. Monkres, J., Luckie, C., Petraco, N.D. and Milam, A., 2013. Comparison and statistical analysis of land impressions from consecutively rifled barrels. AFTE J, 45(1), pp.3-20.
1467. Monturo, C., 2010. The Effect of the Machining Process as it Relates to Toolmarks on Surfaces. AFTE Journal, 42(3), p. 264.
1468. Moran, B. (2001).The Application of Numerical Criteria for Identification in Casework Involving Magazine Marks and Land Impressions. AFTE Journal, Vol. 33, No. 3. pp 41 – 46.
1469. Moran, B. (2003). Toolmark Criteria for Identification: Pattern Match, CMS, or Bayesian? AFTE Journal, Vol. 35, No. 4. pp 359-360. (Reprint from INTERfaces, Vol. 28, Nov-Dec 2001. pp 9-10.)
1470. Moran, B. and Murdock, J. Zen and the Art of Motorcycle Maintenance – Contribution to Forensic Science – An Explanation of the Scientific Method Appendix No. 2 (pp. 234-240) from the article by Grzybowski, R., Miller, J., Moran, B., Murdock, J., Nichols, R., and R. Thompson titled Firearm/Toolmark Identification: Passing the Reliability Test Under Federal and State Evidentiary Standards in AFTE Journal, Vol. 35, No. 2, Spring 2003, pp. 209-241.
1471. Moran, B., Murdock , J. The Application of the Scientific Method to Firearm and Toolmark Examination AFTE J. Spring 2003; Vol 35(, #2), Spring 2003, (Appendix #2),: 234 – 240.
1472. Murdock and Grzybowski. Firearm/Toolmark Identification- Meeting the Daubert Challenge, AFTE Journal Fall 1998; 30(1):3-14

1473. Murdock, J. E., "The Individuality of Tool Marks Produced by Desk Staplers." AFTE Journal, vol. 6 (5), 1974. pp. 23-39.
1474. Murdock, J., (1981) A General Discussion of Gun Barrel Individuality and an Empirical Assessment of the Individuality of Consecutively Button Rifled .22 Caliber Rifle Barrels, AFTE Journal, 13:3, pp. 84-111
1475. Murphy, D., "CTS Error Rates, 1992-2005 Firearms/Toolmarks," Presented at the 41st Association of Firearm and Tool Mark Examiners (AFTE) Training Seminar, Henderson, NV, May 5, 2010.
1476. National Forensic Science Technology Center (NFSTC) - Firearm Examiner Training Program https://www.nfstc.org/service/forensics-training/
1477. National Research Council. *Ballistic Imaging.* The National Academies Press. Washington DC. 2008.
1478. National Research Council. *Forensic Analysis: Weighing Bullet Lead Evidence.* The National Academies Press. Washington DC. 2004.
1479. Neel M., and Wells M., "A Comprehensive Statistical Analysis of Striated Tool Mark Examinations Part I: Comparing Known Matches and Known Non-Matches," AFTE Journal, Volume 39, (4), Summer 2007, pp. 176-198.
1480. Neely, J., Practical Metallurgy & Materials, Wiley & Sons, 1979
1481. Nennstiel R., Rahm J. (2006) A Parameter Study Regarding the IBIS Correlator; J Forensic Sci.,51:1 pp. 18-23
1482. Nennstiel R., Rahm J., (2006) An Experience Report Regarding the Performance of the IBIS Correlator, J Forensic Sci., 51:1, pp. 24-30
1483. Nichols, R. (2003). Consecutive Matching Striations (CMS): Its Definition, Study and Application in the Discipline of Firearms and Tool Mark Identification. AFTE Journal, Vol. 35, No. 3. pp 298-306.
1484. Nichols, R.G. Firearm and Toolmark Identification Criteria: A Review of the Literature, Part II, Journal of Forensic Sciences, Vol. 48, No. 2, March 2003, pp 318-327.
1485. Nichols, R.G., 1997. Firearm and toolmark identification criteria: a review of the literature. Journal of Forensic Science, 42(3), pp.466-474.
1486. Nichols, R.G., Defending the Science of the Firearms and Tool Mark Identification Discipline: Responding to Recent Challenges, Journal of Forensic Sciences, Vol. 52, No. 3, May 2007, pp. 586-594.
1487. O'Hara and Osterberg, J., (1949) An Introduction to Criminalistics, The Macmillian Co., New York
1488. O'Keeffe, C., Champion, S., Allsop, D., 2015. Demonstrating the effect of forensic firearm countermeasures: Bullet characteristics generated due to barrel modifications. Forensic Science International, 257:13-9.
1489. O'Mahony, A.M., Samek, I.A., Sattayasamitsathit, S., Wang, J., 2014. Orthogonal identification of gunshot residue with complementary detection principles of voltammetry, scanning electron microscopy, and energy-dispersive X-ray spectroscopy: sample, screen, and confirm. Analytical Chemistry, 86(16), pp.8031-8036.
1490. Ogihara, Y., et al, Comparison of 5000 Consecutively Fired Bullets and Cartridge Cases From a 45 Caliber M1911A1 Pistol, AFTE Journal, Vol 15, No. 3, July 1983, pp. 127-140.
1491. Ogunc, G.I., Oralli, A., Kara, H., Sayer, A., Sakarya, U., Arican, Y.E., 2013. The performance of BALISTIKA 2010 system for 9 mm x 19 mm and 7.65 mm x 17 mm cartridge case correlation. Forensic Science International, 232(1-3), pp.104-110.
1492. Orench, J. A., "A Validation Study of Fracture Matching Metal Specimens Failed in Tension," AFTE Journal, vol. 37 (2), Spring 2005, pp. 142-149.
1493. Osterburg, James W. (1969). The Evaluation of Physical Evidence in Criminalistics: Subjective or Objective Process? Journal of Criminal Law and Criminology, Vol. 60, No. 1. pp 97-101.
1494. Ostwald and Munoz, Manufacturing Processes and Systems, John Wiley & Sons, Ninth Edition, 1997
1495. Paust, J. (1978). Dum-Dum Bullets, Law, and Objective Scientific Research: The Need for a Configurative Approach to Decision, Jurimetrics, Vol. 18. pp 68-278.

1496. Perez, D.B., Molina, D.K., 2012. The utility of routine histological examination of gunshot wounds. American Journal of Forensic Medicine and Pathology, 33(3): pp.231-233.
1497. Peterson, J.L., "Utilizing the Laser for Comparing Tool Striations"; Journal of the Forensic Science Society, 57 (14), 1974, pp. 57-62
1498. Peterson, J.L., and Markham, P.N., 1995. Crime Laboratory Proficiency Testing Results, 1978-1991, I: Identification and Classification of Physical Evidence. Journal of forensic sciences 40(6), pp. 994-1008.
1499. Peterson, J.L., and Markham, P.N., 1995. Crime Laboratory Proficiency Testing Results, 1978-1991, II: Resolving Questions of Common Origin. Journal of forensic sciences 40(6), pp. 1009-1029.
1500. Petraco D. K., et al, "Application of Machine Learning to Toolmarks: Statistically Based Methods for Impression Pattern Comparisons," NIJ/NCJRS Document #239048, Award #2009-DN-BX-K041, July 2012
1501. Petraco, D. K., et al, "Addressing the National Academy of Sciences' Challenge: A Method for Statistical Pattern Comparison of Striated Tool Marks," Journal of Forensic Sciences, Volume 57(4), 2012, pp. 900-911
1502. Petraco, N., et al, "Estimation of Striation Pattern Identification Error Rates by Algorithmic Methods," AFTE Journal, Volume 45(3), Summer 2013, pp. 235-244.
1503. Petraco, N.D.K., Kuo, L., Chan, H., Phelps, E., Gambino, C., McLaughlin, P., Kammerman, F., Diaczuk, P., Shenkin, P., Petraco, N. and Hamby, J., 2013. Estimates of striation pattern identification error rates by algorithmic methods. AFTE Journal, 45(3), pp.235-44.
1504. Pollack, H. W., Materials Science & Metallurgy, Reston Publications, 1973
1505. Powers, D.B., Delo, R.I., 2013. Characteristics of ballistic and blast injuries. Atlas of the Oral and Maxillofacial Surgery Clinics of North America, 21(1), pp.15-24.
1506. Rahm, J., 2012. Evaluation of an electronic comparison system and implementation of a quantitative effectiveness criterion. Forensic Science International, 214, pp. 173–177.
1507. Reitz, J., "An Unusual Toolmark Identification case." AFTE Journal, vol. 7 (3), Dec., 1975, pp. 40-43.
1508. Riva, F. and Champod, C., "Automatic Comparison and Evaluation of Impressions Left by a Firearm on Fired Cartridge Cases," Journal of Forensic Sciences, Vol. 59(3), May 2014, pp. 637-647.
1509. Riva, F., 2011. Etude sur la valeur indicielle des traces présentes sur les douilles. Université de Lausanne.
1510. Roberge, D., Beauchamp, A., (2006) The Use of BulletTrax-3D in a Study of Consecutively Manufactured Barrels, AFTE Journal 38:2 pp. 166 – 172.
1511. Robinson, M. et al. (1998). Ballistics Imaging – Latest Developments. IEEE Proceedings: 32nd Annual International Carnahan Conference on Security Technology. Pp 181-183.
1512. Romolo, F.S., Christopher, M.E., Donghi, M., Ripani, L., Jeynes, C., Webb, R.P., Ward, N.I., Kirkby, K.J., Bailey, M.J., 2013. Integrated ion beam analysis (IBA) in gunshot residue (GSR) characteristics. Forensic Science International, 231(1-3) pp.219-228.
1513. Rosati, C., "Examination of Four Consecutively Manufactured Bunter Tools." AFTE Journal, vol. 32 (1), 2000, pp. 49-50.
1514. Roth, J., Carriveau, A., Liu, X. and Jain, A.K., 2015. Learning-based ballistic breech face impression image matching. Biometrics Theory, Applications and Systems (BTAS), 7th International Conference IEEE, pp. 1-8.
1515. Saferstein, R. Firearms Identification – Historical Background, Forensic Science Handbook – Volume II, Prentice Hall, 1988, see p. 411 – 415.
1516. Saferstein, R., (1977) Criminalistics: An Introduction to Forensic Science, Prentice-Hall, Inc., Englewood Cliffs, NJ
1517. Salmon, S.C., Modern Grinding Process Technology, McGraw-Hill, Inc., 1992

1518. Saribey, A, and Hannam, A., “Comparison of the Class and Individual Characteristics of Turkish 7.65mm Browning / .32 Automatic Caliber Self-Loading Pistols with Consecutive Serial Numbers,” Journal of Forensic Sciences, Volume 58(1), January 2012, pp. 146-150.
1519. Saribey, A. Y., Hannam A. G., Tarimci C., “An Investigation into Whether or Not the Class and Individual Characteristics of Five Turkish Manufactured Pistols Change During Extensive Firing,” Journal of Forensic Sciences, Volume 54, Number (5), September 2009, Pp.1068-1072.
1520. Sarıbey, A.Y., and Hannam, A.G., 2013. Comparison of the Class and Individual Characteristics of Turkish 7.65 mm Browning/. 32 Automatic Caliber Self-Loading Pistols with Consecutive Serial Numbers. Journal of forensic sciences, 58(1), pp.146-150.
1521. Schecter, B., et al. Extended Firing of a Galil Assault Rifle, AFTE Journal, Vol. 24, No. 1, January 1992, pp. 37 – 45.
1522. Senin, Nicola, et al. (2006). Three-Dimensional Surface Topography Acquisition and Analysis for Firearm Identification. Journal of Forensic Sciences, Vol. 51, No. 2. pp 282-295.
1523. Serhant, J. The Admissibility of Ballistics in Evidence, American Journal of Police Sciences, May – June, 1931, 2(3): 202-210
1524. Shem, R. and Striupaitis, P., (1983) Comparison of 501 Consecutively Fired Bullets and Cartridge Cases From a .25 Caliber Raven Pistol, AFTE Journal, 15:3, pp. 109-112
1525. Skolrood, R. (1975) Comparison of Bullets Fired From Consecutively Rifled Cooey .22 Calibre Barrels, Canadian Society of Forensic Science Journal, 8:2, pp. 49-52
1526. Smith E., Cartridge Case and Bullet Comparison Validation Study with Firearms Submitted in Casework. AFTE Journal, vol. 37 (2), Spring 2005, pp.130-135.
1527. Smith, C. (1997). Fireball: A Forensic Ballistics Imaging System. Institute of Electrical and Electronic Engineers Proceedings: 31st Annual International Carnahan Conference on Security Technology. pp 64-70.
1528. Smith, C. and Li, Dongguang. (2008) Intelligent Imaging of Forensic Ballistics Specimens for ID. IEEE Proceedings: Congress on Image and Signal Processing, Vol 3. pp 37-41.
1529. Smith, C. L. (2002). Linescan Imaging of Ballistics Projectile Markings for Identification. Security Technology Proceedings, 36th Annual International Carnahan Conference, pp. 216 – 222.
1530. Smith, C.L. (2006). Profiling Toolmarks on Forensic Ballistics Specimens: An Experimental Approach. IEEE Proceedings: 40th Annual International Carnahan Conference on Security and Technology. pp 281-286.
1531. Smith, C.L. and Cross, J.M. (1995). Optical Imaging Techniques for Ballistics Specimens to Identify Firearms. IEEE Proceedings: 29th Annual International Carnahan Conference on Security Technology. pp 275-289.
1532. Smith, J.E., Kehoe, A., Harrisson, S.E., Russel, R., Midwinter, M., 2014. Outcome of penetrating intracranial injuries in a military setting. Injury Journal, 45(5), pp.874-878.
1533. Smith, Tasha P., G. Andrew Smith, and Jeffrey B. Snipes. "A validation study of bullet and cartridge case comparisons using samples representative of actual casework." *Journal of forensic sciences* Vol.61, No. 4 (2016): 939-946.
1534. Song, J., 2013. Proposed “NIST Ballistics Identification System”(NBIS) Using 3D Topography Measurements on Correlation Cells. AFTE Journal 45(2) pp. 184-194
1535. Song, J., 2015. Proposed ‘Congruent Matching Cells (CMC)’ Method for Ballistic Identification and Error Rate Estimation. AFTE Journal, 47(3), pp. 177-185.
1536. Song, J., Chu, W., Vorburger, T.V., Thompson, R., Renegar, T.B., Zheng, A., Yen, J., Silver, R. and Ols, M., 2012. Development of ballistics identification—from image comparison to topography measurement in surface metrology.Measurement Science and Technology, 23(5).
1537. Song, J., Vorburger, T., Ballou, S., Ma, L., Renegar, T., Zheng, A. and Ols, M., 2009. Traceability for ballistics signature measurements in forensic science. Measurement, 42(10), pp.1433-1438.

1538. Song, J., Vorburger, T., Renegar, T., Rhee, H., Zheng, A., Ma, L., Libert, J., Ballou, S., Bachrach, B. and Bogart, K., 2006. Correlation of topography measurements of NIST SRM 2460 standard bullets by four techniques. Measurement Science and Technology, 17(3), p.500.
1539. Song, J., Vorburger, T., Thompson, R., Renegar, T., Zheng, A., Ma, L., Yen, J. and Ols, M., 2010. Three steps towards metrological traceability for ballistics signature measurements. Measurement science review, 10(1), pp.19-21.
1540. Song, J., Vorburger, T.V., Ballou, S., Thompson, R.M., Yen, J., Renegar, T.B., Zheng, A., Silver, R.M. and Ols, M., 2012. The national ballistics imaging comparison (NBIC) project. Forensic science international, 216(1), pp.168-182.
1541. Song, J., Vorburger, T.V., Thompson, R., Ballou, S., Zheng, A., Renegar, T.B., Silver, R., Ols, M., Wenz, W., Koch, A. and Braune, M., 2012. Topography Measurements and Performance Comparisons between NIST SRM 2460 Standard Bullet Masters and BKA Bullet Replicas” AFTE Journal 44(3) pp. 208-217.
1542. Spiegelman, C. and Tobin, W.A., 2013. Analysis of experiments in forensic firearms/toolmarks practice offered as support for low rates of practice error and claims of inferential certainty. Law, Probability and Risk, 12(2), pp.115-133.
1543. Spotts, R., and Chumbley, S., “Objective Analysis of Impressed Chisel Toolmarks,” Journal of Forensic Sciences, Volume 60(6), 2015, pp. 1436-1440.
1544. Spotts, R., Chumbley, L.S., Ekstrand, L., Zhang, S. and Kreiser, J., 2015. Angular Determination of Toolmarks Using a Computer-Generated Virtual Tool. Journal of forensic sciences, 60(4), pp.878-884.
1545. Spotts, R., Chumbley, L.S., Ekstrand, L., Zhang, S. and Kreiser, J., 2015. Optimization of a statistical algorithm for objective comparison of toolmarks.Journal of forensic sciences, 60(2), pp.303-314.
1546. Spotts, R., et al., “Angular Determination of Toolmarks Using a Computer-Generated Virtual Tool”. Journal of Forensic Sciences, Volume 60(4), 2015, pp. 878-893.
1547. Springer, E., Toolmark Examinations – A Review of Its Development in the Literature., Journal of Forensic Sciences, Vol. 40, No. 6, November 1995, pp.964-8.
1548. Stein, D., Yu, J.C., 2013. The use of near-infrared photography to image fired bullets and cartridge cases. Journal of Forensic Science, 58(5), pp.1330-1335.
1549. Stone, R. (2003) How Unique are Impressed Marks, Association of Firearm and Toolmark Examiners Journal, 35:4, pp. 376-383.
1550. Stone, R. (2004). A Probabilistic Model of Fractures in Brittle Metals. AFTE Journal, Vol. 36, No. 4. pp 297-301.
1551. Stone, R. How Unique are Impressed Toolmarks? AFTE Journal. Vol. 35, No. 4, Fall 2003. pp. 376-383.
1552. Stone, R.S., 2003. How unique are impressed toolmarks. AFTE Journal, 35(4), pp.376-83.
1553. Stowe, A., 2012. The Persistence of Chamber Marks from Two Semiautomatic Pistols on Over 1,440 Sequentially-Fired Cartridge Cases. AFTE Journal, 44(4), pp. 293–308.
1554. Stroman, A., “Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double-Blind Format,” AFTE Journal, Vol. 46, No. 2, Spring 2014, Pp. 157-175.
1555. Symes, S.A., Rainwater, C.W., Cabo, L.L. and Myster, S.M., 2010. Knife and Saw Toolmark Analysis in Bone: A Manual Designed for the Examination of Criminal Mutilation and Dismemberment - Final Technical Report. Rockville, MD: National Institute of Justice.
1556. Tarifa, A., Almirall, J.R., 2015. Fast detection and characterization of organic and inorganic gunshot residues on the hands of suspects by CMV-GC-MS and LIBS. Science and Justice, 55(3), pp.168-175.
1557. Taroni, F., et al. (1996). Statistics: A Future in Tool Marks Comparison? AFTE Journal, Vol. 28, No. 4. pp 222-232.
1558. Tartaglione, T., Filograna, L., Roiati, G., Guglielmi, G., Colosimo, C., Bonomo, L., 2012. Importance of 3D-CT imaging in single-bullet cranioencephalic gunshot wounds. Official Journal of the Italian Society of Medical Radiology, 117(3), pp.461-470.

1559. Taudte, R.V., Beavis, A., Blanes, L., Cole, N., Doble, P., Roux, C., 2014. Detection of gunshot residues using mass spectrometry. BioMed Research International, volume 2014.
1560. The Association of Firearm and Tool Mark (AFTE) Training manual.
1561. The ATF National Firearms Training Academy (NFEA) -minimum educational qualifications requirements
1562. Thompson, E. and Wyant, R., "Knife Identification Project (KIP)," AFTE Journal, vol. 35 (4), Fall 2003, pp. 366 – 370.
1563. Thompson, E., "False Breechface ID's." AFTE Journal, vol. 28 (2), April, 1996, pp. 95-96.
1564. Thompson, Evan. Phoenix Arms (Raven) Breechface Toolmarks. AFTE Journal, vol. 26 (2), 1994, pp. 134-135.
1565. Thompson, R. (2010). Firearm Identification In The Forensic Science Laborataory. Alexandria, VA: National District Attorneys Association.
1566. Thompson, R., et al. (1996). Computerized Image Analysis for Firearms Identification; The Integragted Ballistic Identification System (IBIS) BRASSCATCHER Performance Study. AFTE Journal, Vol. 28, No. 3. pp 194-203
1567. Thompson, R., Song J., Zheng A., and Yen J. "Cartridge Case Signature Identification Using Topography Measurements and Correlations: Unification of Microscopy and Objective Statistical Methods," National Institute of Standards and Technology, Presented at the 18th European Network of Forensic Science Institutes (ENFSI) Conference, Lisbon, Portugal, October, 2011
1568. Thornton, J. (1979). The Validity of Firearms Evidence. AFTE Journal, Vol. 11, No. 2. pp 16-19. (Reprint from Forum July/August 1978).
1569. Triplett, M., 2015. Complexity, level of association and strength of fingerprint conclusions. Journal of Cold Case Review, 1(2), pp. 6-15.
1570. Tuira, Y. J., "Tire Stabbing with Consecutively Manufactured Knives." AFTE Journal, vol. 14 (1), 1982, pp. 50-52.
1571. Tulleners, F., (October 5, 2001) Technical Evaluation: Feasibility of a Ballistics Imaging Database for all New Handgun Sales. CALDOJ Publication (a peer reviewed report).
1572. Tulleners, F., Giusto, M., Hamiel, J., (1998) Striae Reproducibility of Sectional Cuts of One Thompson Contender Barrel, AFTE Journal, 30:1 pp. 62-81.
1573. Tulleners, F., Hamiel J., "Sub Class Characteristics of Sequentially Rifled .38 Special S&W Revolver Barrels." AFTE Journal, vol. 31 (2), 1999, pp. 117-222.
1574. Turillazzi, E., Di Peri, G.P., Nieddu, A., Bello, S., Monaci, F., Neri, M., Pomara, C., Rabozzi, R., Riezzo, I., Fineschi, V., 2013. Analytical and quantitative concentration of gunshot residues (Pb, Sb, Ba) to estimate entrance hole and shooting-distance using confocal laser microscopy and inductively coupled plasma atomic emission spectrometer analysis: an experimental study. Forensic Science International, 231(1-3), pp142-149.
1575. Tuthill, H., and George, G. (1994). Principles and Procedures in Criminalistics, Lightening Powder Company
1576. Uchiyama T. (1988). A Criterion for Land Mark Identification Using Rare Marks. AFTE Journal, Vol. 20, No. 3, 260-268.
1577. Uchiyama T., Toolmark Reproducibility on Fired Bullets and Expended Cartridge Cases, AFTE JournaL, Volume 40, No. 1, Winter, 2008, pp. 3-46
1578. Uchiyama, T. (1992). The Probability of Corresponding Striae in Toolmarks. AFTE Journal, Vol. 24. No. 3. pp 273-290.
1579. Uchiyama, T. Similarity among Breech Face Marks Fired from Guns with Close Serial Numbers. AFTE Journal, Vol. 18, No. 3, 1986, pp. 15-52.
1580. Uchiyama, T., 1988 – A Criterion for Land Mark Identification. AFTE Journal 1988 Jul; 20(3): 236-251.

1581. Uchiyama, T., 1992. The Probability of Corresponding Striae in Toolmarks. AFTE Journal 1992 Jul; 24(3): 273-290.
1582. Uchiyama, T., 2010. Variation of Markings on Primers of Expended Cartridge Cases: Analysis of Cartridge Cases Fired from Caliber. 25 Semi-Automatic Pistols. AFTE Journal, 42(2), pp.120-131.
1583. Uchiyama, T., Toolmark Reproducibility on Fired Bullets and Expended Cartridge Cases, AFTE Journal, Vol. 40, No.1, 2008) pp. 3 – 46.
1584. Uchiyama, Tsueno. (1988). Automatic Comparison Model of Land Marks. AFTE Journal, Vol. 20, No. 3. pp 252-258.
1585. Uchiyama, Tsueno. (1993). Automated Landmark Identification System. AFTE Journal, Vol 25, No. 3. pp 172-196.
1586. Valle, F., Bianchi, M., Tortorella, S., Pierini, G., Biscarini, F. and D'Elia, M., 2012. Nanotechnology for forensic sciences: Analysis of PDMS replica of the case head of spent cartridges by optical microscopy, SEM and AFM for the ballistic identification of individual characteristic features of firearms. Forensic science international, 222(1), pp.288-297.
1587. Van Dijk, T. M., "Steel Marking Stamps: Their Individuality at the Time of Manufacture." Journal of the Forensic Science Society, vol. 25 (4), July/Aug, 1985, pp. 243-253.
1588. Vandiver, J.V., "Identification and Use of Toolmark Identification," Law and Order, No. 7, 1976
1589. Volkov, N., Finkelstein, N., Novoselsky, Y., Tsach, T., 2015. Bolt cutter blade's imprint in toolmarks examination. Journal of Forensic Sciences, 60(6), pp.1589-1593.
1590. Vorburger, T.V., Song, J., Petraco, N., Topography measurements and applications in ballistics and tool mark identifications. Surgace Topography: Metrology and Properties, 4(1), p. 1-35.
1591. Vorburger, T.V., Yen, J.H., Bachrach, B., Renegar, T.B., Filliben, J.J., Ma, L., Rhee, H.G., Zheng, A., Song, J.F., Riley, M. and Foreman, C.D., 2007. Surface topography analysis for a feasibility assessment of a national ballistics imaging database. National Institute of Standard and Technology 7362, pp. 1–171.
1592. Vuki, M., Shiu, K.K., Galik, M., O'Mahony, A.M., Wang, J., 2012. Simultaneous electrochemical measurement of metal and organic propellant constituents of gunshot residues. Analyst, 137(14), pp.3265-3270.
1593. Walker, R.E., 2012. Cartridges and Firearm Identification. CRC Press.
1594. Warlow, T., (1996) Firearms, the Law and Forensic Ballistics, Taylor & Francis, London, England & Bristol, PA
1595. Watson, D. J., "The Identification of Consecutively Manufactured Crimping Dies," AFTE Journal, vol. 10, September 1978, pp. 19-21.
1596. Watson, D. The Identification of Toolmarks Produced From Consecutively Manufactured Knife Blades in Soft Plastics. AFTE Journal, vol. 10 (3), September, 1978, pp. 43-45.
1597. Weber, I.T., de Melo, A.J., Lucena, M.A., Rodrigues, M.O., Alves, S. Jr., 2011. High photoluminescent metal-organic frameworks as optical markers for the identification of gunshot residues. Analytical Chemistry, 83(12), 4720-4723.
1598. Weimar, B., 2010. Physical Match Examination of the Joint Faces of Adhesive PVC-Tapes. AFTE Journal, 42(3), pp. 271-277.
1599. Welch, A.K., 2013. Breech Face Subclass Characteristics of the Jimenez JA Nine Pistol. AFTE Journal, 45(4), p. 336.
1600. Weller, T., Brubaker, M., Duez, P., and Lilien, R., 2015. Introduction and Initial Evaluation of a Novel Three-Dimensional Imaging and Analysis System for Firearm Forensics. AFTE Journal, 47(4), pp. 198-208.
1601. Weller, T.J., Zheng, A., Thompson, R. and Tulleners, F., 2012. Confocal microscopy analysis of breech face marks on fired cartridge cases from 10 consecutively manufactured pistol slides. Journal of forensic sciences, 57(4), pp.912-917.

1602. Wevers G., Neel, M., and Buckleton, J., 2011. A Comprehensive Statistical Analysis of Striated Toolmark Examinations Part 2: Comparing Known Matches and Known Non Matches and Using Likelihood Ratios. AFTE Journal, 43(2), pp.137-145.
1603. Wiercigroch, M., Cheng A. (1997) Chaotic and Stochastic Dynamics of Orthogonal Metal Cutting. Chaos, Solitons and Fractals, 8:4, April 1997, pp. 715-726.
1604. Wong, C., 2012. The Inter-Comparison of 1,000 Consecutively-Fired 9mm Luger Bullets and Cartridge Cases from a Ruger P89 Pistol Utilizing both Pattern Matching and Quantitative Consecutive Matching Striae as Criteria for Identification. AFTE Journal 45(3), pp.267-272
1605. Wright R.T., Processes of Manufacturing, The Goodheart-Wilcox Co., Inc., 1987
1606. X Zheng, J. S. (2014). Applications of surface metrology in firearm identification. Surface Topography: Metrology and Properties. http://iopscience.iop.org/2051-672X/2/1/014012/
1607. Xie, F., Xiao, S., Blunt, L., Zeng, W. and Jiang, X., 2009. Automated bullet-identification system based on surface topography techniques. Wear, 266(5), pp.518-522.
1608. Yammen, S. and Muneesawang, P., 2013. Cartridge case image matching using effective correlation area based method. Forensic science international, 229(1), pp.27-42.
1609. Yang, Y., Koffman, A., Hocherman, G. and Wein, L.M., 2014. Using Spatial, Temporal and Evidence-status Data to Improve Ballistic Imaging Performance. Journal of forensic sciences, 59(1), pp.103-111.
1610. Yong, J.B., Wun, C.T., and Kuppuswamy, R., 2014. Further Investigations into the Permanence of Breechface Recess and Other Marks on Cartridge Cases Discharged from 9mm Calibre Walther P99 Pistols. AFTE Journal, 46(2), pp. 138-142.
1611. Zhang, S. and Chumbley, L.S., 2013. Manipulative Virtual Tools for Tool Mark Characterization. NCJRS Document #241443, Award # 2009-DN-R-119.
1612. Zheng, A. Establishing a Reference Ballistic Tool Mark Database for Research and Development of Identification Systems and Confidence Limits, NIJ funded project presented at the AFTE Conference, Seattle, 2014.
1613. Zheng, A.X., Soons, J., Thompson, R., Villanova, J. and Kakal, T., 2014. 2D and 3D topography comparisons of toolmarks produced from consecutively manufactured chisels and punches. AFTE Journal, 46(2), pp.143-7.
1614. Zheng, X., Soons, J., Vorburger, T.V., Song, J., Renegar, T. and Thompson, R., 2014. Applications of surface metrology in firearm identification. Surface Topography: Metrology and Properties, 2(1).
1615. Zhihu Huang; Jinsong Leng. (2010). A Novel Binarization Algorithm for Ballistics Imaging Systems. IEEE – 3rd International Congress on Image and Signal Processing, Vol. 3. pp 1287 – 1291.
1616. Zhihu Huang; Jinsong Leng. (2010). An Online Ballistics Imaging System for Firearm Identification. IEEE - 2nd International Conference on Signal Processing Systems, Vol 2. pp 68-72.
1617. Zographos, A., et al. (1997). Ballistics Identification Using Line-Scan Imaging Techniques. IEEE Proceedings: 31st Annual International Carnahan Conference on Security Technology. pp 82-87.

Handwriting

1618. Ahmad, S.M.S., Ling, L.Y., Anwar, R.M., Faudzi, M.A. and Shakil, A., 2013. Analysis of the effects and relationship of perceived handwritten signature's size, graphical complexity, and legibility with dynamic parameters for forged and genuine samples. Journal of forensic sciences, 58(3), pp.724-731.
1619. Alamargot, D., Morin, M.F., 2015. Does handwriting on a tablet screen affect students’ graphomotor execution? A comparison between grades Two and Nine. Human Movement Science, 44, pp.32-41.
1620. Alamilla, F., Calcerrada, M., Garcia-Ruiz, C., Torre, M., 2013. Forensic discrimination of blue ballpoint pens on documents by laser ablation inductively coupled plasma mass spectrometry and multivariate analysis. Forensic Science International, 228(1-3), pp.1-7.
1621. Alkahtani, A.A., and Platt, A.W., 2011. The Influence of Gender on Ability to Simulate Handwritten Signatures: A Study of Arabic Writers. Journal of forensic sciences, 56(4), pp. 950–953.

1622. Alkahtani, A.A.M., 2013. The influence of right or left handedness on the ability to simulate handwritten signatures and some elements of signatures: A study of Arabic writers. Science & Justice, 53(2), pp.159-165.
1623. Al-Musa Alkahtani, A., Platt, A.W.G., 2011. The influence of gender on ability to simulate handwritten signatures: A study of Arabic writers. Journal of Forensic Sciences, 56(4), pp.950-953.
1624. Bird, C., Found, B., and Rogers, D., 2010. Forensic handwriting examiners' skill in distinguishing between natural and disguised handwriting behaviours. Journal of Forensic Science, 55, pp.1291-1295.
1625. Bird, C., Found, B., Ballantyne, K., and Rogers, D., 2010. Forensic handwriting examiners' opinions on the process of production of disguised and simulated signatures. Forensic Science International, 195(1–3),pp. 103-107.
1626. Bird, C., Found, B., Rogers, D., 2010. Forensic document examiners' skill in distinguishing between natural and disguised handwriting behaviors. Journal of Forensic Science, 55(5), pp, 1291-1295.
1627. Bird, C., Found, B., Rogers, D., 2012. Forensic handwriting examiners' skill in detecting disguise behavior from handwritten text samples. Journal of Forensic Documentation examination, 22.
1628. Braz, A., Lopez-Lopez, M., Garcia-Ruiz, C., 2014. Studying the variability in the Raman signature of writing pen inks. Forensic Science International, 245, 38-44.
1629. Braz, A., Lopez-Lopez, M., Garcia-Ruiz, C., Raman imaging for determining the sequence of blue pen ink corssings. Forensic Science International, 249, pp.92-100.
1630. Cadola, L., Margot, P.A. and Marquis, R., 2013. Are simple signatures so easy to simulate. Journal of the American Society of Questioned Document Examiners, 16(2), pp.3-11.
1631. Calcerrada, M., Gonzalez-Herraez, M., Garcia-Ruiz., C., 2015. A microdestructive capillary electrophoresis method for the analysis of blue-pen-ink strokes on office paper. Journal of Chromatography, 1400, pp.140-148.
1632. Caligiuri, M.P. and Mohammed, L.A., 2012. The neuroscience of handwriting: Applications for forensic document examination. CRC Press.
1633. Caligiuri, M.P., Kim, C. and Landy, K.M., 2014. Kinematics of signature writing in healthy aging. Journal of forensic sciences, 59(4), pp.1020-1024.
1634. Caligiuri, M.P., Mohammed, L.A., Found, B. and Rogers, D., 2012. Nonadherence to the isochrony principle in forged signatures. Forensic science international, 223(1), pp.228-232.
1635. Caligiuri, M.P., Teulings, H.L., Dean, C.E., Lohr, J.B., 2015. A quantitative measure of handwriting dysfluency for assessing tardive dyskinesia. Journal of Clinical Psychopharmacology, 35(2), pp.168-174.
1636. Carptenter, M., Schulte-Austum, M., 2013. D-Scribe - Automatic Authorship Identification and Clustering, Siemens AG. www.nist.gov/oles/upload/D-Scribe-Schulte-Austum_2013-MSSFHA-Conference.pdf
1637. Chamberland G. and Ghirotto M., 1990. A Statistical Approach to Handwriting Comparison: Search for Characteristics that are Usable in the General Lineal Model. Canadian Society of Forensic Sciences Presentation
1638. Chang, S.H., Yu, N.Y., 2014. The effect of computer-assisted therapeutic practice for children with handwriting deficit: A comparison with the effect of the traditional sensorimotor approach. Research in Development Disabilities, 35(7), pp.1648-1657.
1639. Da Silva, V.A.G., Talhavini, M., Peixoto, I.C.F., Zacca, J.J., Maldaner, A, O., Braga, J.W.B., 2014. Non-destructive identification of different types and brands of blue pen inks in cursive handwriting by visible spectroscopy and PLS-DA for forensic analysis. Microchemical Journal, 116, 235-243.
1640. Denman, J., Skinner, W.M., Kirkbride, P., Kempson, I.M., 2010. Organic and inorganic discrimination of ballpoint pen inks by TOF-SIMS and multivariate statistics. Applied Surface Science, 256(7), 2155-2163.
1641. Desai, B., Kalyan, J.L., 2013. Forensic Examination of handwriting and signatures. International Journal of Innovative Research & Development, 2(5), pp.514-527.

1642. Dewhurst, T.N., Found, B., Ballantyne, K.N., Rogers, D., 2014. The effects of extrinsic motication on signature authorship opinions in forensic signature blind trials. Forensic Science International, 236, pp.127-132.
1643. Drotar, P., Mekyska, J., Rektrovai, I., Massarova, L., Smekal, Z., Faundez-Zanuy, M., 2014. Analysis of in-air movement in handwriting: A novel marker for Parkinson's disease. Computer Methods and Programs in Biomedicine, 117(3), pp.405-11.
1644. Dyer, A.G., Found, B., Merlino, M.L., Pepe, A.L., Rogers, D. and Sita, J.C., 2014. Eye movement evaluation of signature forgeries: Insights to forensic expert evidence. In Current Trends in Eye Tracking Research, Springer International Publishing. pp. 211-223.
1645. Dziedzic, T., 2016. The influence of lying body position on handwriting. Journal of Forensic Science, 61 (Suppl 1), pp.S177-183.
1646. Eldridge, M.A., Nimmo-Smith, I., Wing, A.M. and Totty, R.N., 1984. The variability of selected features in cursive handwriting: categorical measures. Journal of the Forensic Science Society, 24(3), pp.179-219.
1647. Falk, T., Tam, C., Schellnus, H., Chau, T., 2011. On the development of a computer – based handwriting assessment tool to objectively quantify handwriting proficiency in children. Computer Methods and Programs in biomedicine, 104(3), pp.e102-111.
1648. Feraru, D.L., Meghea, A., 2014. Comparative forensic analysis of ballpoint pen inks. Revista de Chimie, 65, pp.421-425.
1649. Feraru, D.L., Meghea, A., Badea, N., 2013. Forensic discrimination of ballpoint pen inks based on correlation of data obtained by optical and spectral methods. Revista de Chimie, 64(1), pp.74-80.
1650. Found, B. and Ganas, J., 2013. The management of domain irrelevant context information in forensic handwriting examination casework. Science & Justice, 53(2), pp.154-158.
1651. Gallidabino, M., Weyermann, C., Marquis, R., 2011. Differentiation of blue ballpoint pen inks by positive and negative mode LDI-MS. Forensic Science International, 204(1-3), pp.169-178
1652. Hepler, A.B., Saunders, C.P., Davis, L.J. and Buscaglia, J., 2012. Score-based likelihood ratios for handwriting evidence. Forensic science international, 219(1), pp.129-140.
1653. Hölzle, P., Hermsdörfer, J., Vetter, C., 2014. The effects of shift work and time of day on fine motor control during handwriting. Ergonomics, 57(10), pp.1488-1498.
1654. Horton, R.A., 1996. A study of the occurrence of certain handwriting characteristics in a random population. International Journal of Forensic Document Examiners, 2, pp.95-102.
1655. Hosu, A., Pop, B., Cimpoiu, C., 2015. The Forensic analysis of pigments from some inks by HPTLC. Journal of Liquid Chromatography & Related Technologies, 38(11) pp.1109-1112.
1656. Houlgrave, S., LaPorte, G.M., Stephens, J.C., 2011. The use of filtered light for the evaluation of writing inks analyzed using thin layer chromatography. Journal of Forensic Science, 56(3) pp.775-782.
1657. Huber, R., 2000. The Heterogeneity of Handwriting. Journal of American Society of Questioned Document Examiners, 3(1), pp. 2-10.
1658. Jolly, C., Gentaz, E., 2014. Analysis of cursive letters, syllables, and words handwriting in a French second-grade child with Developmental Coordination Disorder and comparison with typically developing children. Frontiers in Psychology, 4, pp.1022.
1659. Jones, R.W., McClelland, J.F., 2013. Analysis of writing inks on paper using direct analysis in real time mass spectrometry. Forensic Science International, 231(1-3), pp.73-81.
1660. Kao, Y.Y., Cheng, S.C., Cheng, C.N., Shiea, J., Ho H, 2014. Detection of trace ink compounds in erased handwriting using electrospray-assisted laser desorption ionization mass spectrometry. Journal of Mass Spectrometry, 49(6), pp.445-451.
1661. Khalid, P.I., Yunus, J., Adnan, R., 2009. Extraction of dynamic features from hand drawn data for the identification of children with handwriting difficulty. Research in Developmental Disabilities, 31(1), 256-262.

1662. Kim, Y.S., Al Otaiba, S., Wanzek, J., Gatlin, B., 2015. Towards an understanding of dimensions, predictors, and gender gap in written composition. Journal of Educational Psychology, 107(1), pp.79-95.
1663. Kömür, İ., Gürler, A.S., Başpınar, B., 2015. Differences in handwritings of schizophrenia patients and examination of the changes after treatment. Journal of Forensic Science.
1664. Koutsoftas, A.D., Gray, S., 2012. Comparison of narrative and expository writing in students with and without language-learning disabilities. Language, Speech, and hearing services in schools, 43(4), pp.395-409.
1665. Kruger, D.M., 2010. The LongPen™—The World's First Original Remote Signing Device. Journal of Forensic Science, 55(3), pp. 795–800.
1666. Kukucka, J., Kassin, S.M., 2014. Do confessions taint perceptions of handwriting evidence? An empirical test of the forensic confirmation bias. Law and Human Behavior, 38(3), pp.256-70.
1667. Kula, A., Wietecha-Posluszny, R., Pasionek, K., Krol, M., Wozniakiewicz, M., Koscielniak, P., 2014. Application of laser induced breakdown spectroscopy to examination of writing inks for forensic purposes. Science and Justice¸ 54, pp.118-125.
1668. Lee, L.C., Nunurung, S.M., Aziz Ishak, A.B., 2014. Forensic analysis of blue ballpoint pen inks on questioned documents by high performance thin layer chromatography technique (HPTLC). The Malaysian Journal of Analytical Sciences, 18(2), 226-233.
1669. Li, B., 2013. Some parameters affecting the diffusion of SO4(2-) used in iron gall ink: preliminary findings. Forensic Science International, 231(1-3).
1670. Li, B., Xie, P., Guo, Y.M., Fei, Q., 2014. GC analysis of black gel pen ink stored under different conditions. Journal of Forensic Sciences, 59(2), pp.543-549.
1671. Livingston, O.B., 1963. Frequency of certain characteristics in handwriting, pen-printing of two hundred people. Journal of Forensic Sciences, 8, pp.250-258.
1672. Maldarelli, J.E., Kahrs, B.A., Hunt, S.C., Lockman, J.J., 2015. Development of early handwriting: Visual-motar control during letter copying. Developmental Psychology, 51(7), pp.879-888.
1673. Maramreddy, U., Agarwal, A., Rao, C.R., 2011. Printed text characterization for identifying print technology using expectation maximization algorithm. Lecture Notes in Computer Science, 7080, pp.201-212
1674. Marquis, R., Bozza, S., Schmittbuhl, M., and Taroni, F., 2011. Handwriting Evidence Evaluation Based on the Shape of Characters: Application of Multivariate Likelihood Ratios. Journal of Forensic Science, 56(S1), pp. S238–S242.
1675. Marquis, R., Bozza, S., Schmittbuhl, M., Taroni, F., 2011. Quantitative assessment of handwriting evidence: The value of the shape of the letter "A". Journal of Forensic Document Examination 21, 17-22.
1676. Matthews, B., Walker, G.S., Kobus, H., Piqou. P., Bird, C., Smith, G., 2011. The analysis of dyes in ball point pen inks on single paper fibres using laser desorption ionization time of flight mass spectrometry (LDI-TOFMS). Forensic Science International, 209(1-3), pp.e26-30.
1677. Moenssens, A., Meeting the Daubert Challenge to Handwriting Evidence – Preparing for a Daubert Hearing, abstract of a talk given at the Second Annual Symposium on the Forensic Examination of Questioned Documents at Albany, N.Y. on June 18, 1999.
1678. Mohammed, L., Found, B., Caligiuri, M. and Rogers, D., 2015. Dynamic characteristics of signatures: effects of writer style on genuine and simulated signatures. Journal of forensic sciences, 60(1), pp.89-94.
1679. Mohammed, L., Found, B., Caligiuri, M., Rogers, D., 2011. The Dynamic Character of Disguise Behavior for Text-Based, Mixed, and Stylized Signatures. Journal of Forensic Science, 56(S1), pp. S136-141.
1680. Montani, I., 2015. Exploring transparent approaches to the authentification of signatures on artwork.

1681. Montani, I., Mazzella, W., Guichard. B., Marquis, R., 2012. Examination of heterogeneous crossing sequences between toner and rollerball pen strokes by digital microscopy and 3-D laser profilometry. Journal of Forensic Sciences, 57(4), pp.997-1002.
1682. Morales, A., Ferrer, M.A., Diaz-Cabrera, M., Carmona, C., Thomas, G.L., 2014. The use of Hyperspectral analysis for ink identification in handwritten documents. Conference Paper.
1683. Nam, Y.S., Park, J.S., Lee, Y., Lee, K.B., 2014. Application of micro-attenuated total reflectance fourier transform infrared spectroscopy to ink examination in signatures written with ballpoint pen on questioned documents. Journal of Forensic Sciences, 59(3), pp.800-805.
1684. Nawrot, M., Automatic author attribution for short text documents. Human Language Technology, 6562, pp.468-477.
1685. Neumann, C., Ramotowski, R., Genessay, T., 2011. Forensic examination of ink by high-performance thin layer chromatography—the United States Secret Service digital ink library. Journal of Chromatography A, 1218(19), pp.2793-2811.
1686. Olson, R.K., Hulslander, J., Christopher, M., Keenas, J., Wadsworth, S., Willcutt, E., Pennington, B., DeFries, J., 2013. Genetic and environmental influences on writing and their relations to language and reading. Annals of Dyslexia, 63(1), pp.25-43.
1687. Owen, J., 2014. Screening the handwriting of different individuals using CEDAR-FOX. Journal of Forensic Document Examination, pp.53-66
1688. Prattichizzo, D., Meli, L., Malvezzi, M., 2015. Digital handwriting with a finger or a stylus: a biomechanical comparison. IEEE Transactions on Haptics, 8(4):356-370.
1689. Rawal, A., Harmer, C.J., Park, R.J., O'Sullivan, U.D., Williams, J.M.G., 2014. A sense of embodiment is reflected in people's signature size. PLoS One, 9(2), pp.e88438.
1690. Reed, G., Savage, K., Edwards, D., Nic Daeid, N., 2014. Hyperspectral imaging of gel pen inks: an emerging tool in document analysis. Science and Justice, 54(2), pp.71-80.
1691. Rosenblum, S., 2015. Do motor ability and handwriting kinematic measures predict organizational ability among children with developmental coordination discorders? Human Movement Science, 43, pp.201-215.
1692. Rosenblum, S., Engel-Yeger, B., Fogel, Y., 2013. Age-related changes in executive control and their relationships with activity performance in handwriting. Human Movement Science, 32(2), pp.363-376.
1693. Rosenblum, S., Samuel, M., Zlotnik, S., Erikh, Z., Schlesinger, I., 2013. Handwriting as an objective tool for Parkinson's disease diagnosis. Journal of Neurology. 260(9), pp.2357-2361.
1694. Saunders, C., Hepler, A., Davis, L., Buscaglia J. 2010. Estimation of likelihood ratios for forensic handwriting analysis. Science and Justice, 50(1), p. 32.
1695. Saunders, C.P., Davis, L.J., and Buscaglia, J., 2011. Using Automated Comparisons to Quantify Handwriting Individuality. Journal of Forensic Science, 56(3), pp. 683–689.
1696. Savoie, K., 2011. The frequency of occurrence of specific handwriting characteristics within a limited population. Journal of the American Society of Questioned Document Examiners, 14(2), pp.29-34.
1697. Schwellnus, H., Carnahan, H., Kushki, A., Polatajko, H., Missiuna, C., Chau, T., 2012. Effect of pencil grasp on the speed and legibility of handwriting in children. American Journal of Occupational Therapy, 66, pp.718-726.
1698. Sciacca, E., 2010. Etude de mentions manuscrites apposées dans des conditions non conventionnelles (dans le cadre des articles 322-1 à 322-4 du Nouveau Code Pénal français).
1699. Sciacca, E., Langlois-Peter, M.B., Margot, P., and Velay, J.L., 2011. Effects of Different Postural Conditions on Handwriting Variability. Journal of Forensic Document Examination, 21, pp. 51-60.
1700. Scordella, A., Di Sano, S., Aureli, T., Cerratti, P., Verratti, V., Frano-Illic, G., Pietrangelo, T., 2015. The role of general dynamic coordination in the handwriting skills of children. Frontiers in Psychology, 6, pp.580.

1701. Seaman Kelly, J., 2002. Habits Observed in Naturally Written Numbers. Journal of American Society of Questioned Document Examiners, 5(2), pp. 58-66.
1702. Shiver, F.C., 1996. Case Report: The Individuality of Handwriting Demonstrated Through the Field Screening of 1000 Writers. In American Society of Questioned Document Examiners annual meeting, Washington, DC.
1703. Spagnolo, G.S., Calabrese, B., Ferrari, G., 2012. Color separation to facilitate handwriting examination. Communications Control and Signal Processing, 2012 5th International Symposium pp.1-4.
1704. Srihari, S., 2010. Computer methods for handwritten questioned documents examination. Department of Justice.
1705. Srihari, S., Xu, Z., Hanson, L., 2014. Development of handwriting individuality: An information theoretic study. 14th international conference on Frontiers in Handwriting Recognition, pp.601-606.
1706. Srihari, S.N., 2014. Role of automation in examination of handwritten items. Pattern Recognition Journal, 47(3).
1707. Stoel, R.D., Van den Heuvel, E., Alewijnse, L.C. 2010. Structural equation modeling of subjective measures with an application to forensic handwriting examination. Science and Justice, 50(1), pp. 31–32.
1708. Sulzenbruck, S., Hegele, M., Rinkenauer, G., Heuer, H., 2011. The death of handwriting: secondary effects of frequent computer use on basic motor skills. Journal of Motor Behavior Impact & Description, 43(3), pp.247-251.
1709. Taroni, F., Marquis, R., Schmittbuhl, M., Biedermann, A., Thiéry, A. and Bozza, S., 2012. The use of the likelihood ratio for evaluative and investigative purposes in comparative forensic handwriting examination. Forensic science international, 214(1), pp.189-194.
1710. Taroni, F., Marquis, R., Schmittbuhl, M., Biedermann, A., Thiéry, A. and Bozza, S., 2014. Bayes factor for investigative assessment of selected handwriting features. Forensic science international, 242, pp.266-273.
1711. Thiéry, A., 2014. Développement d'un processus de quantification et d'évaluation de caractères manuscrits: théorie et applications. Universite de Lausanne Open Archive (serval.unil.ch)
1712. Thiéry, A., Marquis, R. and Montani, I., 2013. Statistical evaluation of the influence of writing postures on on-line signatures. Study of the impact of time. Forensic science international, 230(1), pp.107-116.
1713. Tsao, R., Fartoukh, M., Barbier, M.L., 2011. Handwriting in adults with Down syndrome. Journal of Intellectual and Developmental Disabilities, 36(1), pp.20-6.
1714. Turnbull, S.J., Jones, A.E., Allen, M., Identification of the class characteristics in the handwriting of Polish people writing in English. Journal of Forensic Science, 55(5), pp.1296-1303.
1715. Van Drempt. N., Mccluskey, A., Lannin, N.A., 2011. Handwriting in healthy people aged 65 years and over. Australian occupational therapy journal, 58(4), 276-286.
1716. Vastrick, T., 1998. The Uniqueness of Handwriting. Journal of American Society of Questioned Document Examiners, 1(1), pp. 4-7.
1717. Vastrick, T., 2015. Forensic handwriting comparison examination in the courtroom. The Judges Journal, 54(3), pp.32.
1718. Wang, S., Lu, C., Wang, G., 2015. Examination of the Sequence between Laser Printing and Rollerball Pen Writing Without an Intersecting Stroke. Journal of Forensic Science, 60(6), pp. 1594-600.
1719. Welch, J.R., 1996. A Review of Handwriting Search Cases as an Indicator of the Individuality of Handwriting. American Society of Questioned Document Examiners.
1720. Woodard, J.P., Saunders, C.P., Lancaster, M.J., 2013. Writer Recognition by Computer Vision, MITRE Computer Vision Approach. www.nist.gov/oles/upload/-14-Jeffrey-Woodard-SIFT-Writer-Recognition-by-Computer-Vision-final.pdf

1721. Yancosek, K., Mullineaux, D., 2011. Stability of handwriting performance following injury-induced hand-dominance transfer in adults: A pilot study. Journal of Rehabilitation Research & Development, 48, pp.59-68.

Voice Comparison

1722. Enzinger, E. and Morrison, G.S., 2015. Mismatched distances from speakers to telephone in a forensic-voice-comparison case. Speech Communication, 70, pp.28-41.
1723. Enzinger, E., Morrison, G.S. and Ochoa, F., 2016. A demonstration of the application of the new paradigm for the evaluation of forensic evidence under conditions reflecting those of a real forensic-voice-comparison case. Science & Justice, 56(1), pp.42-57.
1724. Morrison, G. S., 2010. Forensic voice comparison. Freckelton, I. and Selby, H. (Eds.), Expert Evidence, Thomson Reuters, Sydney, Australia, ch. 99.
1725. Morrison, G.S., 2009. Forensic voice comparison and the paradigm shift. Science & Justice, 49(4), pp.298-308.
1726. Morrison, G.S., and Enzinger, E., 2013. Forensic speech science – Review: 2010–2013. In: Proceedings of the 17th International Forensic Science Managers' Symposium, pp. 616–623, 629–635. Lyon, France: INTERPOL.
1727. Morrison, G.S., Ochoa, F. and Thiruvaran, T., 2012. Database selection for forensic voice comparison. In Odyssey, International Speech Communication Association, pp. 62-77.
1728. Morrison, G.S., Rose, P. and Zhang, C., 2012. Protocol for the collection of databases of recordings for forensic-voice-comparison research and practice. Australian Journal of Forensic Sciences, 44(2), pp.155-167.
1729. Morrison, G.S., Zhang, C., Enzinger, E., Ochoa, F., Bleach, D., Johnson, M., Folkes, B.K., De Souza, S., Cummins, N., Chow, D., 2015. Forensic database of voice recordings of 500+ Australian English speakers. Available from: Databases.forensic-voice-comparison.net. (20 May 2016).
1730. Zhang, C., Morrison, G.S., Enzinger, E. and Ochoa, F., 2013. Effects of telephone transmission on the performance of formant-trajectory-based forensic voice comparison–female voices. Speech Communication, 55(6), pp.796-813.

Hair analysis

1731. Barnett, P.D. and Ogle, R.R (1982). Probabilities of Human Hair Comparison. J. Forensic Sci., 27, 272-278.
1732. Bisbing R. (2002). The Forensic Identification and Association of Human Hair; In Saferstein R (Ed): Forensic Science Handbook, Vol 1, 2nd ed; Prentice-Hall: Englewood Cliffs, NJ.
1733. Bisbing, R. E., Wolner, M. F. (1984). Microscopical Discrimination of Twins' Head Hair. Journal of Forensic Sciences, 29, 780-786.
1734. DiZinno, J.A., Wilson, M.R., Budowle, B. (1999). Typing of DNA derived from hairs. Forensic Examination of Hair. Taylor & Francis, London, England, pp. 155-173.
1735. Franbourg, A.,Hallegot, P.,Baltenneck, F., Toutain, C., and Leroy, F.(2003). Current research on ethnic hair, Journal of American Academy of Dermatology, 48, 115-119.
1736. Gaudette, B. D. (1976). Probabilities and Human Pubic Hair Comparisons. Journal of Forensic Science, 21, 514-517.
1737. Gaudette, B. D. (1978). Some further thoughts on probabilities and human hair comparisons, Journal of Forensic Sciences 23:758–763.
1738. Gaudette, B. D., Keeping, E. S. (1974). An attempt at determining probabilities in human scalp hair comparisons. Journal of Forensic Sciences, 19, 599-606.
1739. Gaudette, B.D., "A supplementary discussion of probabilities and human hair comparisons." Journal of Forensic Sciences, Vol. 27, No. 2 (1982):279-89.

1740. Hausman, L. (1944). Applied Microscopy of Hair. The Scientific Monthly, LIX, 195-202.
1741. Hausman. L. (1934). Histological Variability of Human Hair, American Journal of Physical Anthropology, XVIII, 415-428.
1742. Henson, C.R. and Rowe, W.F. (2002). The Effect of Elevated Temperature on the Microscopic Morphology of Human Head Hair. Microscope, 50, 21-24.
1743. Hicks, J.W. (1977). Microscopy of Hair, A Practical Guide and Manual. Federal Bureau of Investigation, U.S. Government Printing Office, Washington, D.C.
1744. Houck, M. M., Budowle, B. (2002). Correlation of Microscopic and Mitochondrial DNA Hair Comparisons. Journal of Forensic Sciences, 47, 964-967.
1745. Khumalo, N.P. et. al. (2000). What is normal black African hair? A light and scanning electron-microscopic study, Journal of American Academy of Dermatology, 43, 814-820.
1746. Koch, S., Michaud, A., and Mikell, C. (2013). Taphonomy of Hair Study of Postmortem Root Banding, Journal of Forensic Science, 58, 52-59.
1747. Lamb, P. and Tucker, L.G. (1994). A study of the probative value of Afro-Caribbean hair comparisons. Journal of the Forensic Science Society, 34, 177-179.
1748. Linch, C.A., Prahlow, J.A., (2001). Postmortem Microscopic Changes Observed at the Human Head Hair Proximal End, Journal of Forensic Science, 46, 15-20.
1749. Marieb, E. N., Hoehn, K. (2010). Human Anatomy & Physiology, Eighth Edition, Pearson Education, Inc., pp157-159.
1750. Miller, L.S. "Procedural bias in forensic examinations of human hair." *Law and Human Behavior,* Vol. 11 (1987): 157.
1751. Miller, Larry S., Procedural bias in forensic science examinations of human hair. Law and Human Behavior 11(2) 157, 1987.
1752. National Research Council of the National Academies (2011). Reference Manual on Scientific Evidence, pg. 113.
1753. National Research Council. Strengthening Forensic Science in the United States: A Path Forward. National Academy Press: Washington, D.C (2009). (http://www.ncjrs.gov/pdffiles1/nij/grants/228091.pdf).
1754. Oien, Cary T. (2009). Forensic Hair Comparison: Background Information for Interpretation, Forensic Science Communications, Volume 11, Number 2.
1755. Petraco, N. et. al., (1988). The Morphology and Evidential Significance of Human Hair Roots, Journal of the Forensic Sciences, 33, 68-76.
1756. Podolak, A. G., and Blythe, C. E. (1985). Microscopic Analysis Unit, FBI Laboratory, "A Study of the Feasibility of Establishing a Computer Data Bank for Hair Characterization Using Standard Descriptive Criteria," Proceedings of the International Symposium on Forensic Hair Comparisons, FBI Academy, Quantico, Virginia, 149-150.
1757. Reimer, N.L. "The hair microscopy review project: An historic breakthrough for law enforcement and a daunting challenge for the defense bar." *The Champion*, (July 2013): 16.
1758. Robertson, J. (1999). Forensic Examination of Hairs. London: Taylor and Francis.
1759. Scientific Working Group on Materials Analysis (SWGMAT) (2005). Forensic Human Hair Examination Guidelines, Forensic Science Communications, Volume 7, Number 2.
1760. Strauss, M.T. (1983). Forensic characterization of human hair. The Microscope, 31, 15-29.
1761. Suzanski, T.W. (1988). Dog hair comparison: A preliminary study. Canadian Society of Forensic Science Journal, 21, 19-28.
1762. Suzanski, T.W. (1989). Dog hair comparison: Purebreds, mixed breeds, multiple questioned hairs. Canadian Society of Forensic Science Journal, 22, 299-309.
1763. Tolgyesi, Eva, Coble, D.W., Fang, F.S., and Kairinen, E.O. (1983). A comparative study of beard and scalp hair; Journal of the Society of Cosmetic Chemists, 34, 367-382.

1764. Tridico S. (2005). Examination, Analysis, and Application of Hair in Forensic Science – Animal (non-human) Hair. Forensic Science Review, 17, 17-28.
1765. Wickenheiser, R. A., Hepworth, D. G. (1990). Further evaluation of probabilities in human scalp hair comparisons. Journal of Forensic Sciences, 35, 1323-1329.
1766. Wilson, M R et al. (1995). Validation of mitochondrial DNA sequencing for forensic casework analysis. International Journal of Legal Medicine, 68-74.
1767. Wilson, MR et al. (1995). Extraction, PCR amplification and sequencing of mitochondrial DNA from human hair shafts, Bio Techniques, 662-669.

Fiber analysis

1768. American Association of Textile Chemist and Colorists, AATCC Technical Manual, Research Triangle Park, N.C
1769. American Society for Testing and Materials (1987): Standard Test Methods for Identification of Fibers in Textiles. ASTM D 276-87
1770. American Society for Testing and Materials (2008): Standard Guide for Forensic Analysis of Fibers by Infrared Spectroscopy. ASTM E 2224-02.
1771. Brady, Jr., R.F. (2003). Comprehensive Desk Reference of Polymer Characterization and Analysis: Polymer Characterization and Analysis, American Chemical Society and Oxford Univeristy Press, New York, NY
1772. Bruschweiler,W. and Grieve, M.C. (1997). A study on the random distribution of a red acrylic target fibre. Sci Justice 37 (2) 85-89.
1773. Champod, C. and Taroni, F. (1997). Bayesian framework for the evaluation of fibre transfer evidence, Science and Justice, 37: 75-83
1774. Cook, R. and Salter A.-M. (1993). The significance of finding extraneous fibres on clothing. IAFS, Dusseldorf.
1775. Cook, R., WebbSalter, M.T., and Marshall, L. (1997) The significance of fibres found in head hair. Forensic Sci. Int. 87 (2) 155-160.
1776. Cook, R., and Wilson, C. (1986). The significance of finding extraneous fibers in contact cases. Forensic Sci. Int. 32 (4), 267-273.
1777. Coyle, T., Shaw, C., and Stevens, L. (2013). The evidential value of fibres used in ‘Hi-Vis’work wear. http://www.contacttraces.co.uk/contact-traces-research
1778. Davison’s Textile Blue Book, Davison Publishing Co., Inc, Concord, NC.
1779. Deadman, H.A. (1984). Fiber evidence and the Wayne Williams Trail, FBI Law Enforcement Bulletin.
1780. E.I. Du Pont de Nemours & Company. (1961). Identification of Fibers in Textile Materials. Technical Information Bulletin X-156
1781. Grieve, M.C., Biermann, T.W., and Schaub, K. (2005). The individuality of fibers used to provide forensic evidence – not all blue polyesters are the same, Science and Justice, 45: pp 13-28.
1782. Hatch, K.L. Textile Science. (1993). West Publishing Company, St. Paul, MN. Chapter 1.
1783. Heyn, A.N.J. (1953). The Identification of Synthetic Fibers by Their Refractive Indices and Birefringence, Textile Research Journal, 23:246-251.
1784. Houck, M.M. (2005). Forensic Fiber Examination and Analysis, Forensic Science Review, 17: 29, pp 30-49.
1785. Houck, M. (2003). Inter-comparison of unrelated fiber evidence, Forensic Science International, 135:146-149.
1786. Houck, M., Walbridge-Jones, S. (2009). Forensic Identification of textile fibers: Chapter 9 – Microspectrophotometry for textile fiber color measurement. The Textile Institute, Woodhead Publishing Limited, Cambridge, England.

1787. Jackson, G. and Cook, R. (1986). The significance of fibers found on car seats. Forensic Sci. Int. 32 (4), 275-281.
1788. Jones, T. and Coyle, T. (2010). Synthetic flock fibres: a population and target fibre study. Sci. Justice 51(2), 68-71.
1789. Kelly, E. and Griffin, R. (1998). A target fibre study on seats in public houses. Sci. Justice 38 (1) 39-44.
1790. Matos, Louis J. (1919). The Identification of Textile Fibers, Part 1. Textiles, 13-14.
1791. Matos, Louis J. (1919). The Identification of Textile Fibers, Part 2. Textiles, 16.
1792. Mukhopadhyay, S. (2003). FTIR Spectroscopy – Principles and Applications. Journal of the Textile Association, 64 (4), 187-191.
1793. Palmer, R., Burnett, E., Luff, N., Wagner, C., Stinga, G., Carney, C., and Sheridan, K. (2015). The prevalence of two ‘commonly’ encountered synthetic target fibres within a large urban environment. Sci. Justice 55, 103-106.
1794. Palmer, R. (1995) A Survey of Dye Batch Variation, Science and Justice. 35, 59-64.
1795. Palmer, R. and Chinherende, V. (1996). A target fiber study using cinema and car seats as recipient items. J. Forens Sci. 41 (5) 802-803.
1796. Palmer, R., Hutchinson, W., Fryer, V. (2009). The discrimination of (non-denim) blue cotton. Science & Justice, 49, 12-18.
1797. Pounds,.C.A.; Smalldon, K.W. (1975). The transfer of fibres between clothing materials during simulated contacts and their persistence during wear. Part I--fibre transference. Journal of Forensic Science, 15, 17-27.
1798. Pounds,.C.A.; Smalldon, K.W. (1975). The transfer of fibres between clothing materials during simulated contacts and their persistence during wear. Part II--fibre persistence. Journal of Forensic Science, 15, 29-37.
1799. Pounds,.C.A.; Smalldon, K.W. (1975). The transfer of fibres between clothing materials during simulated contacts and their persistence during wear. Part III--a preliminary investigation of the mechanisms involved. Journal of Forensic Science, 15, 197-207.
1800. Robertson, J. and Grieve, M. (1999). Forensic Examination of Fibres, London: Taylor and Francis.
1801. The Textile Institute, Manchester (1985). Identification of Textile Materials, Manara Printing Services, London.
1802. Scientific Working Group on Materials Analysis (SWGMAT), Forensic Fiber Examination Guidelines, Forensic Science Communications, Apr. 1999, vol. 1, no. 1, Chapter 6.
1803. Was-Gubala, J. (2009). The kinetics of colour change in textiles and fibres treated with detergent solutions Part I – Colour perception and fluorescence microscopy analysis. Science and Justice, 49, 165-169.
1804. Was-Gubala, J., Grzesiak, E. (2010). The kinetics of colour change in textiles and fibres treated with detergent solutions Part II – Spectrophotometric measurements. Science and Justice, 50, 55-58.
1805. Wiggins, K., Cook, R. and Turner Y. (1988). Dye Batche Variation in Textile Fibers, Journal of forensic Sciences, 33:4, pp. 998-1007.
1806. Wiggins, K. and Holmes, J.A. (2005). A further study of dye batch variation in textile and carpet fibres. Science and Justice, 45:2, 94-96.
1807. Wiggins, K., Drummond, P., and Champod, T.H. (2004). A study in relation to the random distribution of four fibre types on clothing (incorporating a review of previous target fibre studies). Sci. Justice 44 (3) 141-148.
1808. World Directory of Manufactured Fiber Producers, Fiber Economics Bureau, Arlington, VA.

Other

1809. AABB, Standards for Relationship Testing Laboratories, (2011). 10th edition.

1810. AFTE Board of Directors and Editorial Committee, 2015. Comments on NCFS Views Document: “Scientific Literature in Support of Forensic Science and Practice”. AFTE Journal, 45(2), pp. 109-111.
1811. Aitken, C., Berger, C.E., Buckleton, J.S., Champod, C., Curran, J., Dawid, A.P., Evett, I.W., Gill, P., Gonzalez-Rodriguez, J., Jackson, G. and Kloosterman, A., 2011. Expressing evaluative opinions: a position statement.Science and justice, 51(1), pp.1-2.
1812. Aitken, C., Jackson, G., Roberts, P., 2012. Communicating and interpreting statistical evidence in the administration of criminal justice, Part 1. Fundamentals of probability and statiscial evidence in criminal proceedings, Royal Statistical Societiy, pp.121.
1813. Alan Agresti; Brent A. Coull: Approximate Is Better than "Exact" for Interval Estimation of Binomial Proportions. The American Statistician 52(2), 119-126, 1998.
1814. Alberink, L., de Jongh, A., Rodriquez, C., 2014. **F**ingermark evidence evaluation based on automated fingerprint identification system matching scores: the effect of different types of conditioning on likelihood ratios. Journal of Forensic Science, 59(1):70-81.
1815. Along, J., Glasner, H., 2010. Ninhydrin thiohemiketals: basic research towards improved fingermark detection techniques employing nano-technology. Journal of Forensic Science, 55(1):215-20.
1816. Alosh et al., Statistical considerations on subgroup analysis in clinical trials.” Statistics in Biopharmaceutical Research, September 2015.
1817. Antoine, K., Mortazavi, S., Miller, A.D., Miller, L.M., 2010. Chemical differences are observed in children’s versus adults’ latent fingerprints as a function of time. Journal of Forensic Science, 55(2), 513.
1818. Aqudelo, J., Huynh, C., Halamek, J., 2015. Forensic determination of blood sample age using a bioaffinity-based assay. Analyst, 140(5), pp.1411-1415.
1819. Association of Forensic Science Providers, 2009. Standards for the formulation of evaluative forensic science expert opinion. Sci. Justice, 49, pp.161-164.
1820. Attard-Montalto, N., Ojeda, J.J., Reynolds, A., Ismail, M., Bailey, M., Doodkorte, L., de Puit, M., Jones, B.J., 2014. Determining the chronology of deposition of natural fingermarks and inks on paper using secondary ion mass spectrometry. Analyst, 139(18): 4641-53.
1821. Baechler, S., 2015. Des faux documents d'identité au renseignement forensique : Développement d'une approche systématique et transversale du traitement de la donnée forensique à des fins de renseignement criminel, (questioned documents)
1822. Baechler, S., Boivin, R., and Margot, P., 2015. Analyse systématique des faux documents d'identité à des fins de renseignement criminel: vers la construction de connaissances sur la criminalité par l'étude de la trace matérielle, Revue internationale de criminologie et de police technique et scientifique, 68(3), pp. 315-337.
1823. Baechler, S., Fivaz, E., Ribaux, O., and Margot, P., 2011. Le profilage forensique des fausses pièces d'identité: une méthode de renseignement prometteuse pour lutter contre la fraude documentaire. Revue internationale de criminologie et de police technique et scientifique, 64(4), pp. 467-480.
1824. Baechler, S., Margot, P., 2015. Understanding crime and fostering security using forensic science: the example of turning false identity documents into forensic intelligence. Security Journal.
1825. Baechler, S., Terrasse, V., Pujol, J.P., Fritz, T., Ribaux, O. and Margot, P., 2013. The systematic profiling of false identity documents: Method validation and performance evaluation using seizures known to originate from common and different sources. Forensic science international, 232(1), pp.180-190.
1826. Bailey, M.J., Bright, N.J., Croxton, R.S., Francese, S., Ferguson, L.S., Hinder, S., Jickells, S., Jones, B.J., Jones, B.N., Kazarian, S.G., Ojeda, J.J., Webb, R.P., Wolstenholme, R., Bleay, S., 2012. Chemical characterization of latent fingerprints by matrix-assisted laser desorption ionization, time-of-flight secondary ion mass spectrometry, mega electron volt secondary mass spectrometry, gas chromatography/mass spectrometry, X-ray photoelectron spectroscopy, and attenuated total

reflection Fourier transform infrared spectroscopic imaging: an intercomparison. Analytical Chemistry, 84(20):8514-23.
1827. Bailey, M.J., Ismail, M., Bleay, S., Bright, N., Levin Elad, M., Cohen, Y., Geller, B., Everson, D., Costa, C., Webb, R.P., Watts, J.F., de Puit, M., 2013. Enhanced imaging of developed fingerprints using mass spectrometry imaging. Analyst, 138(21): 6246-50.
1828. Ball, G.R., Srihari, S.N., 2011. Statistical characterization of handwriting characteristics using automated tools. Document Recognition and Retrieval, XVIII, 78740H.
1829. Barros, R.M., Faria, B.E., Kuckelhaus, S.A., 2013. Morphometry of latent palmprints as a function of time. Science and Justice, 53(4):402-8.
1830. Berger, C.E., Buckleton, J., Champod, C., Evett, I.W. and Jackson, G., 2011. Evidence evaluation: a response to the court of appeal judgment in R v T. Science & Justice, 51(2), pp.43-49.
1831. Berryman, H.E., Shirley, N.R., Lanfear, A.K., 2013. Basic gunshot trauma interpretation in forensic anthropolgy. In Forensic Anthropology: An Introduction. Boca Raton, FL: CRC Press.
1832. Bieber, P. “Fire investigation and cognitive bias.” *Wiley Encyclopedia of Forensic Science,* 2014, available through onlinelibrary.wiley.com/doi/10.1002/9780470061589.fsa1119/abstract.
1833. Biedermann, A., Curran, J., 2014. Drawbacks in the scientification of forensic science. Forensic Science International, 245, pp.e38-e40.
1834. Biedermann, A., Garbolino, P., Taroni, F., 2013. The subjectivist interpretation of probability and the problem of individualization in forensic science. Science & Justice, 53(2), pp.192-200.
1835. Biedermann, A., S. Bozza, et al. (2008). "Decision theoretic properties of forensic identification: Underlying logic and argumentative implications." Forensic Science International 177(2-3): 120-132.
1836. Biedermann, A., Taroni, F., 2013. On the value of probability for evaluating results of comparative pattern analyses. Forensic Science International, 232(1-3), pp.e44-e45.
1837. Biedermann, A., Voisard, R., Taroni, F., 2012. Learning about Bayesian networks for forensic interpretation: an example based on the 'the problem of multiple propositions'. Sci Justice, 52(3), pp. 191-8.
1838. Biswal, M.R., et al (2010). Investigating the time of a questioned digital document: A forensics approach. Siddhant – A Journal of Decision Making. 10(1), pp. 77-81.
1839. Bogusz, M.J. (In press). Factors influencing quality of interpretation in forensic toxicology and pathology. TIAFT Bulletin.
1840. Bogusz, M.J. ed., 2011. Quality Assurance in the Pathology Laboratory; Forensic, Technical, and Ethical Aspects. CRC Press, Boca Raton.
1841. Bogusz, M.J., 2015. Quality Assurance of Forensic-Toxicological Analysis: Selected Issues. Arab Journal of Forensic Sciences and Forensic Medicine. 1(11), pp. 103-113.
1842. Boroditsky, L. (2007). Comparison and the development of knowledge. Cognition, 102, 118-128.
1843. Bouchet, C., Guillemin, F., and S. Braincon. “Nonspecific effects in longitudinal studies: impact on quality of life measures.” *Journal of Clinical Epidemiology,* Vol. 49, No. 1 (1996): 15-20.
1844. Bowers. M. Does a criminal defendant have a Constitutional privilege to oppose scientifically invalid forensic evidence after conviction? CIP Op-ed. (Unknown date).
1845. Bozza, S., Broseus, J., Esseiva, P., Taroni, F., 2014. Bayesian classification criterion for forensic multivariate data. Forensic Science International, 244, pp. 295-301.
1846. Bracht, G.H., and G.V. Glass. “The external validity of experiments.” *American Educational Research Journal,* Vol. 5, No. 4 (1968): 437-74.
1847. Bradshaw, R., Bleay, S., Wolstenholme, R., Clench, M.R., Francese, S., 2013. Towards the integration of matrix assisted laser desorption ionisation mass spectrometry imaging into the current fingermark examination workflow. Forensic Science International, 232(1-3):111-24.

1848. Bradshaw, R., Rao, W., Wolstenholme, R., Clench, M.R., Bleay, S., Francese, S., 2012. Seperation of overlapping fingermarks by matrix assisted laser desorption ionization mass spectrometry imaging. Forensic Science International, 222(1-3): 318-26.
1849. Bradshaw, R., Wolstenholme, R., Ferguson, L.S., Sammon, C., Mader, K., Claude, E., Blackledge, R.D., Clench, M.R., Francese, S., 2013. Spectroscopic imaging based approach for condom identification in condom contaminated fingermarks. Analyst, 138(9), pp.2546-2557.
1850. Bremmer, R.H., Nadort, A., van Leeuwen, T.G., van Gemert, M.J., Aalders, M.C., 2011. Age estimation of blood stains by hemoglobin derivative determination using reflectance spectroscopy. Forensic Science International, 206(1-3), pp.166-171.
1851. Brown C., Bryant, T., and Watkins M. D. The Forensic Application of High Dynamic Range Photography. J. Forens. Ident. 2010; 60(4): 449-459.
1852. Brown, L.D., Cai, T.T., and A. DasGupta. “Interval estimation for a binomial proportion.” *Statistical Science*, Vol. 16, No. 2 (2001): 101-33.
1853. Buchanan, H.A.S., Kerr, W.J., Meier-Augenstein, W., Daeid, N.N., 2011.Organic impurities, stable isotopes, or both: A comparison of instrumental and pattern recognition techniques for the profiling of 3,4-methylenedioxymethamphetamine. Analytical methods, 3(20), pp. 2279-2288.
1854. Buckleton J.S., Triggs, C.M., Champod, C., An extended likelihood ratio framework for interpreting evidence, Science & Justice 2006 46 69-78.
1855. Budowle, B. et al., (2009). A Perspective on Errors, Bias, and Interpretation in the Forensic Sciences and Direction for Continuing Advancement. J Forensic Sci, 54(4), pp. 798-809
1856. Busey, T. & Dror, I.E. Special abilities and vulnerabilities in forensic expertise. In A. McRoberts (Ed.) Friction Ridge Sourcebook. Washington DC, USA: NIJ Press. March, 2011
1857. Busey, T. A. and Dror, I. E., "Chapter 15: Special Abilities and Vulnerabilities in Forensic Expertise,” in The Fingerprint Sourcebook, International Association for Identification, Ed. Washington DC: National Institute of Justice, 2011, http://www.ncjrs.gov/pdffiles1/nij/225335.pdf.
1858. Busey, T., Swofford, H., Vanderkolk, J., Emerick, B., 2015. The impact of fatique on latent prints examinations as revealed by behavioral and eye gaze testing. Forensic Science International, 251 (2015): 202–208.
1859. Byrd, J.S., Confirmation bias, ethics, and mistakes in forensics. J Forensic Identification, 2006, 56, 511–525
1860. Carroro, P., and M. Plebani. “Errors in a stat laboratory: types and frequencies 10 years later.” *Clinical Chemistry,* Vol. 53 (2007): 1338-42.
1861. Champod, C. (2014). Research focused mainly on bias will paralyse forensic science. Science & Justice, 54, 107–109.National Physical Laboratory. (2010) “A Beginner’s Guide to Measurement”.
1862. Committee on the Conduct of Science, National Academy of Sciences. On being a scientist, Proceeding of the National Academy of Sciences (December 1989) 86(23):9053-9074.
1863. Cooley, C.M., Psychological influences and the state employed forensic examiner: How to elicit evidence concerning observer effect errors through cross-examination and discovery. Illinois Association of Criminal Defense Lawyers Newsletter Summer, 2003.
1864. Crime Laboratory Proficiency Test Results, 1978-1991, II: Resolving Questions of Common Origin, Journal of Forensic Sciences, Vol. 40, No. 6, November 1995, pp. 1009-1029. (12 separate tests involving between 72 and 163 laboratories.)
1865. CTS 1978 - 1991, Stephen Bunch summary and slight revision of Peterson & Markham F/T results. Internet Source: www.swggun.org/resources/admissibility/prof_test results081603.pdf
1866. CTS 1992 – 2005, F/T results revisions by Douglas Murphy, Presentation at 2010 AFTE Training Seminar (also at www.swggun.org/resources/docs/CTSErrorRates.pdf)
1867. CTS Results Revisited: A Review and Recalculation of the Peterson and Markham Findings, by: Bunch, Stephen

1868. Curran, J.M., 2013. Is forensic science the last bastion of resistance against statistics?. Science & Justice, 53(3), pp.251-252.
1869. da Silva Barboza, Lins, R., de Jesus, D., 2013. A color-based model to determine the age of documents for forensic purposes. IEEE Computer Society, pp.1350-1354.
1870. David Freedman, Roger Pisani, Roger Purves: Statistics. Norton, 2007.
1871. David S Moore, George P McCabe, Bruce A Craig: Introduction to the Practice of Statistics. W.H. Freeman, 2009.
1872. Davis, L.J., Saunders, C.P., Hepler, A.B., Buscaglia, J., 2012. Using subsampling to estimate the strength of handwriting evidence via score-based likelihood ratios. Forensic Science International, 216 (1-3), pp.146-157.
1873. De Alcaraz-Fossoul, J., Barrot Feixat, C., Roberts, K., 2015. The paradigm of fingerprint age determiniation. Jacobs Journal of Forensic Science, 1(1): 006.
1874. De Jong, G.D., 2014. Field Study on the Attraction and Development of Insects on Human Meconium and Breast-fed-Infant Feces. Journal of forensic sciences, 59(5), pp.1394-1396.
1875. de la Hunty, M., Moret, S., Chadwick, S., Lennard, C., Spindler, X., Roux, C., 2015. Understanding Physical Developer (PD): Part II—Is PD targeting eccrine constituents? Forensic Science International, 257: 488-95.
1876. De Paoli, G., Lewis S.A. SR., Schuette, E.L., Lewis, L.A., Connatser, R.M., Farkas, T., 2010. Photo- and thermal-degradation studies of select eccrine fingerprint constituents. Journal of Forensic Science, 55(4):962-9.
1877. Deming JE, Mittleman RE, Wetli CV J Forens Sci; 28(3): 572-6 Forensic science aspects of fatal sexual assaults on women. 1983
1878. Doi, K. “Computer-aided diagnosis in medical imaging: historical review, current status and future potential.” *Computerized Medical Imaging and Graphics*, Vol. 31, No. 4-5 (2007): 198-211.
1879. Dror IE, Charlton D; 2006 -Why experts make errors, J Forensic Identif, 56:600–16.
1880. Dror, I, E., “Practical Solutions to Cognitive and Human Factor Challenges in Forensic,” Forensic Science Policy & Management: An International Journal, vol. 4 (3-4), pp. 1-9, 2013.
1881. Dror, I. and Charlton, D. Why Experts Make Errors, Journal of Forensic Identification 2006, 56(4): 600-616.
1882. Dror, I. and Rosenthal, R., 2008. Meta-analytically quantifying the reliability and biasability of forensic experts. Journal of Forensic Sciences, 53(4), pp.900-903.
1883. Dror, I. and Rosenthal, R., Meta-analytically Quantifying the Reliability and Biasability of Forensic Experts, Journal of Forensic Science July 2008, 53(4): 900-903.
1884. Dror, I. E. and Cole, S. A., "The Vision in “Blind” Justice: Expert Perception, Judgment, and Visual Cognition in Forensic Pattern Recognition," Psychonomic Bulletin & Review, vol. 17 (2), pp. 161-167, 2010.
1885. Dror, I. E., “The ambition to be scientific: Human expert performance and objectivity,” Science & Justice, vol. 53 (2), pp. 81-82, 2013.
1886. Dror, I. E., Kassin, S., Kukucka, J., “New application of psychology to law: Improving forensic evidence and expert witness contributions,” Journal of Applied Research in Memory and Cognition, vol. 2 (1), pp. 78-81, 2013.
1887. Dror, I., 2011. The paradox of human expertise: why experts can get it wrong. The Paradox Brain, pp.177-188.
1888. Dror, I., 2015. Cognitive neuroscience in forensic science: understanding and utilizing the human element.
1889. Dror, I., Charlton, D., and Peron, A., Contextual Information Renders Experts Vulnerable to Making Erroneous Identification, Forensic Science International 2006, 156: 74-78.

1890. Dror, I., Charlton, D., Hind, S. and Peron, A., When Emotions Get the Better of Us: The Effect of Contextual Top-Down Processing on Matching Fingerprints, Applied Cognitive Psychology 2005, 19: 799-809.
1891. Dror, I., Wertheim, K., 2011. Quantified assessment of AFIS contextual information on accuracy and reliability of subsequent examiner conclusions. Department of Justice, 235288.
1892. Dror, I.E. "A hierarchy of expert performance. *Journal of Applied Research in Memory and Cognition*." *Journal of Applied Research in Memory and Cognition,* Vol. 5 (2016): 121-127.
1893. Dror, I.E. and Fraser-Mackenzie, P.A.F., Cognitive Biases in Human Perception, Judgment, and Decision Making: Bridging Theory and the Real World in Criminal Investigative Failures, Ed. Rossmo, K., Taylor & Francis, 2008.
1894. Dror, I.E. et al., Decision making under time pressure: An independent test of sequential sampling models. Memory & Cognition 1999, 27 (4), 713-725
1895. Dror, I.E. How can Francis Bacon help forensic science? The four idols of human biases. Jurimetrics: The Journal of Law, Science, and Technology (in press).
1896. Dror, I.E. On proper research and understanding of the interplay between bias and decision outcomes, Forensic Science International, 191, 2009.
1897. Dror, I.E. Paradoxical functional degradation in human expertise. In N. Kapur, Pascual-Leone, & V. S. Ramachandran (Eds.) The Paradoxical Brain. Cambridge, UK: Cambridge University Press. (in press).
1898. Dror, I.E., 2012. Cognitive forensics and experimental research about bias in forensic casework. Science & Justice, 52(2), pp.123-130.
1899. Dror, I.E., and Cole, S.A., The vision in 'blind' Justice: Expert perception, judgment and visual cognition in forensic pattern recognition, Psychonomic Bulletin & Review, in press.
1900. Dror, I.E., Champod, C., Langenburg, G., Charlton, D., Hunt, H., and R. Rosenthal. "Cognitive issues in fingerprint analysis: Inter- and intra-expert consistency and the effect of a 'target' comparison." *Forensic Science International*, Vol. 208, No. 1-3 (2011): 10-7.
1901. Edelman, G., Manti, V., van Ruth, S.M., van Leeuwen, T., Aalders, M.C., 2012. Identification and age estimation of blood stains on colored backgrounds by near infrared spectroscopy. Forensic Science International, 220(1-3), pp.239-244.
1902. Edelman, G.J., Gaston, E., Van Leeuwen, T.G., Cullen, P.J. and Aalders, M.C.G., 2012. Hyperspectral imaging for non-contact analysis of forensic traces. Forensic science international, 223(1), pp.28-39.
1903. Edmond, G., 2013. Expert evidence in reports and courts. Australian Journal of Forensic Sciences, 45.
1904. Edmond, G., Martire, K., Kemp, R., Hamer, D., Hibbert, B., Ligertwood, A., Porter, G., San Roque, M., Searston, R., Tangen, J. and Thompson, M., 2014. How to cross-examine forensic scientists: a guide for lawyers. Australian Bar Review, 39, pp.174-196.
1905. Edmond, G., Tangen, J., Searston, R., Dror, I., "Contextual bias and cross-contamination in the forensic sciences: the corrosive implications for investigations, plea bargains, trials and appeals," Law, Probability & Risk, vol. 14 (1), pp. 1-25, 2015.
1906. Edmond, G., Thompson, M., Tangen, J., 2013. A guide to interpreting forensic testimony: Scientific approaches to fingerprint evidence. Law, Probability and Risk, 0, 1–25.
1907. Edson, S., Ross, J., Coble, M., Parson, T., Barritt, S. Naming the dead – confronting the realities of rapid identification of degraded skeletal remains. Forensic Science Review (2004)16(1):64-90
1908. Edwards, H. and Gotsonis, C., 2009. Strengthening forensic science in the United States: A path forward. Statement before the United State Senate Committee on the Judiciary.
1909. Ermer, J. and Ploss, H.J., 2005. Validation in pharmaceutical analysis: Part II: central importance of precision to establish acceptance criteria and for verifying and improving the quality of analytical data. Journal of pharmaceutical and biomedical analysis, 37(5), pp.859-870.
1910. Evan Thompson, 2015. Consecutively-Made Letter Stamps. AFTE Journal, 47(2), p. 119.

1911. Evett, I. W. (1987). "Bayesian Inference and Forensic Science: Problems and Perspectives." The Statistician 36(2): 99-105.
1912. Evett, I. W. and J. S. Buckleton (1989). "Some Aspects of the Bayesian Approach to Evidence Evaluation." Journal of the Forensic Science Society 29(5): 317-324.
1913. Evett, I., Evaluation and professionalism. Science and Justice 49, 2009.
1914. Faigman, D.L., Kaye, D.H., Saks, M.J., and J. Sanders (Eds). *Modern Scientific Evidence: The Law and Science of Expert Testimony, 2015-2016 ed.* Thomson/West Publishing (2016).
1915. Fawcett, A. S., "The Role of the Footmark Examiner," Journal of the Forensic Science Society, 10 (4): 227-244, 1970.
1916. FBI Laboratory Operations Manual, Practices for Scientific or Technical Conflict Resolution.
1917. FDA Guidance for Industry: E9 Statistical Principles for Clinical Trials (September 1998).
1918. FDA Guidance: "Adaptive Designs for Medical Device Clinical Studies" (2016).
1919. FDA Guidance: "Design Considerations for Pivotal Clinical Investigations for Medical Devices" (2013).
1920. Fienberg, S. E. and M. O. Finkelstein (1996). Bayesian Statistics and the Law. Bayesian Statistics.
1921. Findley, K.A., Johnson, D.R., Judson, K.H., Staas, M.L., Redleaf, D.L. and Hyman, C.J., 2015. Shaken Baby Syndrome/Abusive Head Trauma: A Complicated Child Welfare Issue. Abusive Head Trauma: A Complicated Child Welfare Issue (July 6, 2015), 37.
1922. Finkelstein, M. O. and W. B. Fairley (1970). "A Bayesian Approach to Identification Evidence." Harvard Law Review 83(3): 489-517.
1923. Forensic Science Regulator, 2014. Codes of practice and conduct for forensic science 590 providers and practitioners in the criminal justice system, Version 2.0. Birmingham, UK: Forensic Science Regulator.
1924. Forensic Science Regulator, 2014. Draft guidance: Digital forensics method validation. Birmingham, UK: Forensic Science Regulator.
1925. Forrest, R., Context-free forensic science. Science and Justice 44(2), 2004.
1926. Found, B. and Edmond, G., 2012. Reporting on the comparison and interpretation of pattern evidence: recommendations for forensic specialists. Australian journal of forensic sciences, 44(2), pp.193-196.
1927. Found, B., 2015. Deciphering the human condition: the rise of cognitive forensics. Australian Journal of Forensic Sciences, 47(4), pp.386-401.
1928. Fraser, J., Deacon, P., Bleay, S., Bremner, D., 2014. A comparison of the use of vacuum metal deposition versus cyanoacrylate fuming for visualisation of fingermarks and grab impressions on fabrics. Science and Justice, 54(2): pp.130-140.
1929. Galbally, J., Martinez-Diaz, M., Fierrez, J., 2013. Aging in biometrics: an experimental analysis on on-line signature. PLoS one. 8(7), pp.1-17.
1930. Garrett, B.L., and P.J. Neufeld. "Invalid forensic science testimony and wrongful convictions." *Virginia Law Review*, Vol. 91, No. 1 (2009): 1-97.
1931. Gentile, N., Siegwolf, R.T.W., Esseiva, P., Doyle, S., Zollinger, K., Delemont, O., 2015. Isotope ratio mass spectrometry as a tool for source inference in forensic science: A critical review. Forensic Science International, 251. pp. 139-158.
1932. George Snedecor, William G Cochran: Statistical Methods, 8th ed., Iowa State University Press, 1989; Gerald van Belle, Lloyd D Fisher, Patrick Heagerty, Thomas Lumley, Biostatistics: A Methodology for the Health Sciences, Wiley, 2004.
1933. Geradts, Z., Bijhold, J. (2002) Content based information retrieval in forensic image databases Journal of Forensic Sciences Volume: 47 Issue:2, 285-292
1934. Gianelli PC; 2007 – Case Legal Studies Research Paper No. 08-06, Criminal Law Bulletin 43:
1935. Giannelli, P., 2010. Daubert and forensic science: The pitfalls of law enforcement control of scientific research. University of Illinois Law Review.

1936. Giannelli, P.C. "The admissibility of novel scientific evidence: Frye v. United States, a half-century later." *Columbus Law Review*, Vol. 80, No. 6 (1980).
1937. Giannelli, P.C. "The Supreme Court's 'Criminal' *Daubert* Cases." *Seton Hall Law Review,* Vol. 33 (2003): 1096.
1938. Giannelli, P.C., Confirmation Bias, Criminal Justice, 22(3), 2007.
1939. Giannelli, P.G. "Independent crime laboratories: The problem of motivational and cognitive bias." *Utah Law Review,* (2010): 247-66.
1940. Gilet, E., Diard, J. 2011. Bayesian action-perception computational model: Interaction of production and recognition of cursive letters. PLoS one, 6(6), e20387.
1941. Gittelson, S. and J. Buckleton. "Is the factor of 10 still applicable today?" Presentation at the 68th Annual American Academy of Forensic Sciences Scientific Meeting, 2016.
1942. Gittelson, S., Biedrmann, A., Bozza, S., Toroni, F., 2012. The database search problem: a question of rational decision making. Forensic Science International, 222(1-3), pp.186-199.
1943. Goldstone, R. L. (1994). The role of similarity in categorization: Providing a groundwork. Cognition, 52, 125–157.
1944. Government Office for Science, 2015. Forensic Science and Beyond: Authenticity, Provenance and Assurance: Annual Report to the Government Chief Scientific Adviser 2015. London, UK.
1945. Gross, S.R., and M. Shaffer. "Exonerations in the United States, 1989-2012." National Registry of Exonerations, (2012) available at: www.law.umich.edu/special/exoneration/Documents/exonerations_us_1989_2012_full_report.pdf
1946. Halder, B., Garain, U., 2010. Color feature based approach for determining ink age in printed docuemnts. 20th International Conference on Pattern Recognition (ICPR), pp.3212-3215.
1947. Hasel, S, Kassin, L. On the presumption of evidentiary independence Psychological Science; Can Confessions Corrupt Eyewitness Identifications? 20(1), 2009
1948. Hassin, R. (2001). Making features similar: comparison processes affect perception. Psychonomic Bulletin & Review, 8, 728–731.
1949. Heudt, L., Debois, D., Zimmerman, T.A., Kohler, L., Bano, F., Partouche, F., Duwez, A.S., Gilbert, B., De Pauw, E., 2012. Raman spectroscopy and laser desorption mass spectrometry for minimal destructive forensic analysis of black and color inkjet printed documents. Forensic Science International, 219(1-3), pp.64-75.
1950. Holland, J.W. Medical chemistry & toxicology, W.B. Saunders Co. 1915:574.
1951. Huang, Y., Yan, J., Hou, J., Fu, X., Li, L., Hou, Y., 2015. Developing a DNA methylation assay for human age prediction in blood and bloodstain. Forensic Science International: Genetics, 17, pp.129-136.
1952. International Association for Identification. Letter to Patrick J. Leahy, Chairman, Senate Committee on the Judiciary, March 18, 2009. Available at: https://www.theiai.org/current_affairs/nas_response_leahy_20090318.pdf
1953. International Vocabulary of Metrology – Basic and General Concepts and Associated Terms (VIM 3rd edition) JCGM 200:2012.
1954. Jonathan J. Koehler. "Intuitive error rate estimates for the forensic sciences." (August 2, 2016). Available at SSRN: http://ssrn.com/abstract=2817443 or http://dx.doi.org/10.2139/ssrn.2817443.
1955. K. Inman and N. Rudin. 2001. Principles and Practice of Criminalistics. Boca Raton, FL: CRC Press, p. 129.
1956. Kassin, S., Dror, I., Kukucka, J. 2013. The forensic confirmation bias: Problems, perspectives and proposed solutions. Journal of Applied Research in Memory and Cognition, 2, pp.42-52.
1957. Kaur, R., Saini, K., Sood, N.C., 2013. Application of video spectral comparator (absorption spectra) for establishing the chronological order of intersecting printed strokes and writing pen strokes. Science and Justice, 53(2), pp.212-219.

1958. Khan, Z., Shafait, F., Mian, A., 2015. Automatic ink mismatch detection for forensic document analysis. Pattern Recognition, 48(11), pp.3615-3626.
1959. Kim, J., Novemsky, N., and Dhar, R. (2012). Adding small differences can increase similarity and choice. Psychological Science, 24, 225–229.
1960. Kirk, P., (1953) Crime Investigation, John Wiley & Sons, New York, London, Sydney, Toronto
1961. Koehler, J. J., Forensic Science Accuracy: Why We Know Little and How to Learn More. Draft. May 2016.
1962. Koehler, J.J. “Forensics or fauxrensics? Testing for accuracy in the forensic sciences.” papers.ssrn.com/sol3/papers.cfm?abstract_id=2773255.
1963. Koenig, A., Bugler, J., Kirsch, D., Kohler, F., Weyermann, C., 2015. Ink dating using thermal desorption and gas chromatography/mass spectrometry: comparison of results obtained in two laboratories. Journal of Forensic Science, 60(Suppl 1), pp.S152-S161.
1964. Koppl, R. and Krane, D. Minimizing and leveraging bias in forensic science. In Robertson CT, Kesselheim AS, editors. *Blinding as a solution to bias: Strengthening biomedical science, forensic science, and law*. Atlanta, GA: Elsevier; 2016.
1965. Koppl, R. and Whitman, G. (2010). Rational Bias in Forensic Science. Law, Probability & Risk, Vol. 9. pp 69-90.
1966. Kuhn, T.S., 1962. The structure of scientific revolutions. University of Chicago press.
1967. Langleben and Moriarty (2013) “Using Brain Imaging for Lie Detection: Where Science, Law, and Policy Collide” Psychology, Public Policy, and Law. Vol. 19, No. 2, 222–234.
1968. Larkey, L. B., & Markman, A. B. (2005). Processes of similarity judgment. Cognitive Science, 29, 1061–1076.
1969. Li, B., 2014. Dating of black gel ink using the dissolution-diffusion method. Forensic Science International, 234, pp.126-131.
1970. Li, B., Xie, P., 2015. Dating of iron gall ink using the dissolution-diffusion method. Journal of Forensic Science, 60(2), pp.476-481.
1971. Li, B., Zhang, X., Bao, R., 2013. Experimental studies on estimating the age of carbonless copy documents by the fading rate methods. Australian Journal of Forensic Sciences, 45(2), pp.199-210.
1972. Lincoln E Moses: Think and Explain with Statistics, Addison-Wesley, 1986.
1973. López-López, M., Vaz, J. and García-Ruiz, C., 2015. Confocal Raman spectrocopy for the analysis of nail polish evidence. Talanta, 138, pp.155-162.
1974. Lu, C., and X. Tang. “Surpassing human-level face verification performance on LFW with GaussianFace.” arxiv.org/abs/1404.3840.
1975. Ma, R., Bullock, E., Maynard, P., Reedy, B., Shimmon, R., Lennard, C., Roux, C, McDonagh, A., 2011, Fingermark detection on non-porous and semi-porous surfaces using NaYF4:Er,Yb up-converter particles. Forensic Science International, 207(1-3):145-9.
1976. Mangione-Smith, R., Elliott, M.N., McDonald, L., and E.A. McGlynn. “An observational study of antibiotic prescribing behavior and the Hawthorne Effect.” *Health Services Research,* Vol. 37, No. 6 (2002): 1603-23.
1977. Maritire, K.A., Kemp, R.I., Watkins, I., Sayle, M.A., Newell, B.R., 2013. The expression and interpretation of uncertain forensic science evidence: verbal equivalence, evidence strength, and the weak evidence effect. Law and Human Behavior, 37(3), pp.197-207.
1978. Marsh, DM, Hanlon, TJ; 2007 - Seeing What We Want to See: Confirmation Bias in Animal Behavior Research, Ethology, 113:1089-98.
1979. Martire, K.A., Watkins, I., 2015. Perception problems of the verbal scale: A reanalysis and application of a membership function approach. Science and Justice, 55(4), pp.264-273.

1980. Masters N, Shipp E, Morgan R; 1991 - DFO, Its Usage and Results- A Study of Various Paper Substrates and the Resulting Fluorescence Under a Variety of Excitation Wavelengths, Forensic Identification, 41(1).
1981. Mat-Desa, W.N.S., Ismail, D., Daeid, N.N., 2011. Classification and Source Determination of Medium Petroleum Distillates by Chemometric and Artificial Neural Networks: A Self Organizing Feature Approach. Analytical Chemistry, 83(20), pp. 7745-7754.
1982. McCarney, R., Warner, J., Iliffe, S., van Haselen, R., Griffin, M., and P. Fisher. "The Hawthorne Effect: a randomized, controlled trial." *BMC Medical Research Methodology*, Vol. 7, No. 30 (2007).
1983. McGregor, L.A., Gauchotte-Lindsay, c., Daeid, N.N., Thomas, R., Kalin, R.M., 2012. Multivariate statistical methods for the environmental forensic classification of coal tars from former manufactured gas plants. Environ Sci Technology, 46(7), pp. 3744-52
1984. Medicolegal Investigation of Death, 4th Edition, Edited by SpitzWU, Charles C. Thompson, Ltd:Springfield, IL 2006
1985. Medin, D. L., Goldstone, R. L., & Gentner, D. (1993). Respects for similarity. Psychological Review, 100, 254–278.
1986. Medin, D. L., Goldstone, R. L., & Markman, A. B. (1995). Comparison and choice: Relations between similarity processes and decision processes. Psychonomic Bulletin and Review, 2, 1–19.
1987. Merlino, M., Validity, Reliability, Accuracy, and Bias in Forensic Signature Identification. Department of Justice Grant 2010-DN-BX-K271, Document number 248565.
1988. Miller, Larry S., Bias among forensic document examiners: A need for procedural changes. J Police Science and Administration, 12(4), 1984.
1989. Milne, R. (2012). Forensic intelligence. Boca Raton: Taylor & Francis.
1990. Miskelly, G.M. and Wagner, J.H., 2005. Using spectral information in forensic imaging. Forensic science international, 155(2), pp.112-118.
1991. Mitchell, L., Merlino, M., A Blind Study on the Reliability of Hand Printing Identification by Forensic Document Examiners, Journal of the American Society of Questioned Document Examiners, June 2016, Vol 19, No. 1, p. 25-31.
1992. Mnookin, J.L., Cole, S.A., Dror, I.E., Fisher, B.A.J., Houck, M.M., Inman, K., Kaye, D.H., Koehler, J.J., Langenburg, G., Risinger, D.M., Rudin, N., Siegel, J., and D.A. Stoney. "The need for a research culture in the forensic sciences." *UCLA Law Review,* Vol. 725 (2011): 754-8.
1993. Mohammed, L., Ostrum, B. 2010. Using Adobe Photomerge™ for Demonstrative Evidence, Journal of the American Society of Questioned Document Examiners, Forensic Sci Int, 13(1).
1994. Morelato, M., Baechler, S., Ribaux, O., Beavis, A., Tahtouh, M., Kirkbride, P., Roux, C., Margot, P., 2014. Forensic intelligence framework--Part I: Induction of a transversal model by comparing illicit drugs and false identity documents monitoring. Forensic Science International, 236, pp.181-190.
1995. Morelato, M., Beavis, A., Tahtouh, M., Ribaux, O., Kirkbridge, P., Roux, C., 2013. The use of forensic case data in intelligence-led policing: the example of drug profiling. Forensic Science International, 226(1-3), pp.1-9.
1996. Morrison et al. (2011) "An empirical estimate of the precision of likelihood ratios from a forensic-voice-comparison system" Forensic Science International. Volume 208, Pages 59–65.
1997. Morrison, G.S., 2011. Measuring the validity and reliability of forensic likelihood-ratio systems. Science & Justice, 51(3), pp.91-98.
1998. Morrison, G.S., 2012. The likelihood-ratio framework and forensic evidence in court: a response to R v T. The International Journal of Evidence & Proof,16(1), pp.1-29.
1999. Morrison, G.S., 2014. Distinguishing between forensic science and forensic pseudoscience: Testing of validity and reliability, and approaches to forensic voice comparison. Science & Justice, 54(3), pp.245-256.

2000. Mujis, D. "Measuring teacher effectiveness: Some methodological reflections." *Educational Research and Evaluation*, Vol. 12, No. 1 (2006): 53–74.
2001. Mullen, C., Spence, D., Moxey, L., Jamieson, A., 2014. Perception problems of the verbal scale. Science and Justice, 54(2), pp.154-158.
2002. Nader, M.I., AL-Thwani, A.N., Mohammed, A.K. and Omar, A.J., 2012. Genotyping of the ABO blood group system in Iraq population using PCR-RFLP. Iraqi Journal of Biotech, 11(2), pp. 464-474.
2003. National Academies of Sciences, Engineering, and Medicine. *Support for Forensic Science Research: Improving the Scientific Role of the National Institute of Justice.* The National Academies Press. Washington DC. (2015): p. 15.
2004. National Institute of Justice. *Status and Needs of Forensic Science Service Providers: A Report to Congress.* 2006.
2005. National Institute of Standards and Technology. "New NIST Center of Excellence to Improve Statistical Analysis of Forensic Evidence." (2015).
2006. National Policing Improvement Agency.2007. Practical advice on police use of digital images, p28.
2007. National Research Council, *"Biometric Recognition: Challenges and opportunities."* The National Academies Press. Washington DC. (2010).
2008. National Research Council, 2009. Strengthening Forensic Science in the United States: A Path Forward. The Naitonal Academies Press. Washington, D.C.
2009. National Research Council, 2011. Reference manual on Scientific Evidence. 3rd Edition. National Research Council of the National Academies, Washington D.C.
2010. Neufeld, P.J., Colman, N. "When science takes the witness stand." *Scientific American*, Vol. 262 (1991).
2011. Nieuwenhuis G; 1991 - Lens focus shift required for reflected ultraviolet and infrared photography, J Bio Photo, 59(1).
2012. Nosofsky, R. M. (1986). Attention, similarity, and the identification-categorization relation. Journal of Experimental Psychology, General, 115, 39–57.
2013. O'Hara, C. E., Fundamentals of Criminal Investigation, Charles C. Thomas, Springfield, Illinois, 1956, 726-735.
2014. Oliver, WR 1998. Image processing in forensic pathology. Clinical Laboratory Medicine 18 (1): 151-180.
2015. Ozbek, N., Braz, A., Lopez-Lopez, M., Garcia-Ruiz, C., 2014. A study to visualize and determine the sequencing of intersecting ink lines. Forensic Science International, 234, pp.39-44.
2016. Page et al. (2011) "Uniqueness in the forensic identification sciences—Fact or fiction?" *Forensic Science International*, Vol.206 (1), pp.13.
2017. Page M, Taylor J, Blenkin M; 2011 - Forensic Identification Science Evidence Since Daubert: Part II—Judicial Reasoning in Decisions to Exclude Forensic Identification Evidence on Grounds of Reliability, J Forensic Sci, 56:913–917.
2018. Page, M., Taylor, J. & Blenkin, M. (2011). Forensic Identification Science Evidence since Daubert: Part I—A Quantitative Analysis of the Exclusion of Forensic Identification Science Evidence. Journal of Forensic Sciences, 56 (5), 1180–1184.
2019. Page, M., Taylor, J., Blenkin, M., 2011. Uniqueness in the forensic identification sciences—fact of fiction? Forensic Science International, 206(1-3):12-8.
2020. Park, C., Stojilijkovic, L., Milicic, B., Lin, B., Dror, I.E., 2014. Training induces cognitive bias: the case of a simulation-based emergency airway curriculum. Simulation in Healthcare, 9(2) pp.85-93.
2021. Patel, E., Cole, L.M., Bradshaw, R., Batubara, A., Mitchell, C.A., Francese, S., Clench, M.R., 2015. MALDI-MS imaging for the study of tissue pharmacodynamics and toxicodynamics. Bioanalysis Journal, 7(1):91-101.
2022. Pavese, F. "An Introduction to Data Modelling Principles in Metrology and Testing." In Data Modeling for Metrology and Testing in Measurement Science, Pavese, F. and Forbes, A. B. Eds. (2009).

2023. Peter Amitage, G. Berry, JNS Matthews: Statistical Methods in Medical Research, 4th ed., Blackwell Science, 2002.
2024. Peterson JL1, Markham PN J Forensic Sci. 1995 Nov;40(6):994-1008. Crime Laboratory Proficiency Testing Results, 1978-1991, I: Identification And Classification Of Physical Evidence.
2025. Peterson, J. L., Markham, P, “Crime Lab Proficiency Testing Results, 1978-1991, II: Resolving Questions of Common Origin,” Journal of Forensic Sciences, JFSCA, Vol. 40, No. 6, November 1995, pp. 1009-1029.
2026. Peterson, J.L., Lin, G., Chen, Y., Gaenssien, R.E., 2003. The feasibility of external blind DNA proficiency testing. II. Experience with actualy blind tests. Journal of Forensic Sciences, 48(1), pp.32-40.
2027. Peterson, J.L., Lin, G., Ho, M., Chen, Y., Gaenssien, R.E., 2003. The feasibility of external blind DNA proficiency testing. I. Background and findings. Journal of Forensic Sciences, 48(1), pp.21-31.
2028. Phillips V.L., Saks M.J., Peterson J.L., The application of signal detection theory to decision-making in forensic science. J Forensic Sci; 46(2) 2001.
2029. Pierce LJ, Strickland DJ, Smith ES Am J Forensic Med Pathol; 11(2):171-7 The case of Ohio v. Robinson. 1990
2030. Plebani, M., and P. Carroro. “Mistakes in a stat laboratory: types and frequency.” *Clinical Chemistry,* Vol. 43 (1997): 1348-51.
2031. Pocock, SJ. Clinical trials: a practical approach, Wiley, Chichester (1983).
2032. Powell PM. 2003 - CCD Imaging: When Every Photon Counts, Photonics Spectra, Pittsfield, MA:Laurin Publishing Co. Inc.
2033. Prange, M.T., Coats, B., Duhaime, A.C. and Margulies, S.S., 2003. Anthropomorphic simulations of falls, shakes, and inflicted impacts in infants. Journal of neurosurgery, 99(1), pp.143-150.
2034. Pratama, S.F., Pratiwi, L., Abraham, A., Muda, A.K., 2014. Computational intelligence in digital forensics. Forensic Investigation and Applications, pp.1-16.
2035. Pu, D., Srihari, S., 2010. Probabilistic measure for signature verification based on Bayesian learning. IEEE.
2036. Rao, V. J., “Patterned Injury and Its Evidentiary Value,” Journal of Forensic Sciences Vol. 31 No 2 pp 768-772, 1986.
2037. Redmayne, M., Roberts, P., Aitken, C.G.G., Jackson, G., 2011. Forensic science evidence in question. Criminal Law Review, 5, pp. 347–356.
2038. Ribaux, O., Baylon, A., Roux, C., Delemont, O., Lock, E., Zingg, C., Margot, P., 2010. Intelligence-led crime scene processing, Part I: Forensic intelligence. Forensic Science International, 195(1-3), pp. 10-16.
2039. Ribaux, O., Girod, A., Walsh, S. J., Margot, P., Mizrahi, S. & Clivaz, V. (2003). Forensic intelligence and crime analysis. Law, Probability and Risk, 2, 47–60.
2040. Ribaux, O., Talbot Wright, B., 2014. Expanding forensic science through forensic intelligence. Science & Justice, 54(6), 494-501.
2041. Risinger DM, Saks MJ, Thompson WC, Rosenthal R; 2002 - The Daubert/Kumho Implications of Observer Effects in Forensic Science: Hidden Problems of Expectation and Suggestion, Calif. Law Rev, 90(1):1-56.
2042. Risinger DM; 2010 - Whose Fault? – Daubert, the NAS Report and the Notion of Error in Forensic Science, Fordham Urban Law Journal, 1-22.
2043. Risinger, D. M., Thompson, W. C., Jamieson, A., Koppl, R., Kornfield, I., Krane, D., Mnookin, J. L., Rosenthal, R., Saks, M. J., & Zabell, S. L. (2014). Regarding Champod, editorial: “Research focused mainly on bias will paralyse forensic science”. Science and Justice, 54(6):508-9.
2044. Robert V Hogg, Elliot Tanis, Dale Zimmerman: Probability and Statistical Inference, 9th ed., Pearson, 2015.

2045. Robertson, B. and Vignaux, G.A., 1995. Interpreting evidence: evaluating forensic science in the courtroom. Chichester UK: Wiley.
2046. Robertson, B., Vignaux, G.A. and Berger, C.E.H. 'Extending the confusion about Bayes'. The Modern Law Review, 2011, 74(3): 430-455.
2047. Rose, P., 2002. Forensic Speaker Identification. London, UK: Taylor and Francis.
2048. Rossy, Q., Ioset, S., Dessimoz, D., Ribaux, O., 2013. Integrating forensic information in a crime intelligence database. 230(1-3), 137-146.
2049. Royal Canadian Mounted Police. Integrated forensic identification services standard operating guidelines (SOGs) 10: Enhancement of crime scene images.
2050. Saks, M. J. and J.J. Koehler. "The individualization fallacy in forensic science evidence." Forensic Science Evidence." *Vanderbilt Law Review,* Vol. 61, No. 1 (2008): 199-218.
2051. Saks, M.J. "Implications of *Daubert* for forensic identification science." 1 *Shepard's Expert and Science Evidence Quarterly* 427, (1994).
2052. Saks, M.J. and Koehler, J.J., 2005. The coming paradigm shift in forensic identification science. Science, 309(5736), pp.892-895.
2053. Saks, M.J., Risinger, D.M., Rosenthal, R., Thompson, W.C., Context effects in forensic science: A review and application of the science of science to crime laboratory practice in the United States. Science & Justice, 43(2), 2003.
2054. Saks, MJ; Forensic identification: From a faith-based "Science" to a scientific science, Forensic Sci Int, 201(1-3):14-7.
2055. San Roman, I, Bartolome, L., Alonso, M.L., Alonso, R.M., Ezcurra, M., 2015. DATINK pilot study: an effective methodology for ballpoint pen ink dating in questioned documents. Analytical Chemica Acta, 892, pp.105-114.
2056. Schroff, F., Kalenichenko, D., and J. Philbin. "FaceNet: A unified embedding for face recognition and clustering." arxiv.org/abs/1503.03832
2057. Scientific Working Group on Imaging Technology. 2007. Section 1. Best practices for forensic image analysis. Version 1.6, p.1.
2058. Scientific Working Group on Imaging Technology. 2007. Section 12. Best practices for forensic image analysis. Version 1.6, p.9.
2059. Scientific Working Group on Imaging Technology. 2010. Section 11. Best practices for documenting image enhancement. Version 1.3, p.3.
2060. Semiconductor & Dimensional Metrology Division, National Institute of Standards and Technology, 100 Bureau Drive, Gaithersburg, MD 20899-8212
2061. Senior, S., Hamed, E., Masoud, M., Shehata, E., 2012. Characterization and dating of blue ballpoin pen inks using principal component analysis of UV-Vis absorption spectra, IR spectroscopy, and HP TLC. Journal of Forensic Science, 57(4), pp.1087-1093.
2062. Servick, K., 2015. Forensic labs explore blind testing to prevent errors. Science, 349, pp.462-463.
2063. Sewell, J., Quinones, I., Ames, C., Multaney, B., Curtis, S., and Seeboruth, H., et al. (2008) Recovery of DNA and fingerprints from touched documents, Forensic Science International: Genetics 2(4):281-285.
2064. Sharma, S.K. and Agarwal, D.D., 2015. A Direct and simplistic Bromination of commercially important organic compounds in aqueous media by eco-friendly AlBr3-Br2 reagent system. Chemistry International, 1(3), pp.106-115.
2065. Sheets, H.D., Torres, A., Langenburg, G., Bush, P.J., Bush, M.A., 2014. Distortion in fingerprints: a statistical investigation using shape measurement tools. Journal of Forensic Science, 59(4):1113-20.
2066. Shiraishi, J., Li, Q., Appelbaum, D., and K. Doi. "Computer-aided diagnosis and artificial intelligence in clinical imaging." *Seminars in Nuclear Medicine*, Vol. 41, No. 6 (2011): 449-62.
2067. Siegel, J., Saukko, P., 2013. Encyclopedia of Forensic Sciences, 2nd Edition.

2068. Smith, J., (2007) Image enhancement and Adobe Photoshop: Using calculations to extract image detail, Journal of Forensic Identification Volume: 57 Issue: 4, 493 to 505
2069. Stahl, M., Lund, E.D., and I. Brandslund. "Reasons for a laboratory's inability to report results for requested analytical tests." *Clinical Chemistry,* Vol. 44 (1998): 2195-7.
2070. Swecker, C., and M. Wolf, "An Independent Review of the SBI Forensic Laboratory" images.bimedia.net/documents/SBI+Report.pdf
2071. SWGIT, Best Practices for Archiving Digital and Multimedia Evidence (DME) in the Criminal Justice System, 6/4/07, ver. 1.0, https://www.swgit.org/documents/All%20Current%20Documents
2072. SWGIT, Section 13 "Best Practices for Maintaining the Integrity of Digital Images and Digital Video" and Section 14 "Best Practices for Image Authentication," https://www.swgit.org/documents/All%20Current%20Documents
2073. SWGIT, Section 19, Issues Relating to Digital Image Compression and File Formats, ver. 1.1 2011.01.15, https://www.swgit.org/documents/All%20Current%20Documents
2074. SWGIT, Section 21, Procedure for Testing Scanner Resolution for Latent Print Imaging, ver. 1.0 2012.01.12, https://www.swgit.org/documents/All%20Current%20Documents
2075. SWGIT, Section 22, Procedure for Testing Digital Camera System Resolution for Latent Print Photography, ver. 1.0 2012.01.13, https://www.swgit.org/documents/All%20Current%20Documents
2076. Szafarska, M., Wietecha-Posluszny, R., Wozniakiewicz, M., Koscielniak, P., 2011. Examination of colour inkjet printing inks by capillary electrophoresis. Talanta, 84(5), pp.1234-1243.
2077. Szynkowska, M.I., Czerski, K., Paryjczak, T., Parczewski, A., 2010. Ablative analysis of black and colored toners using LA-ICP-TOF-MS for the forensic discrimination of photocopy and printer toners. Surface and Interface Analysis, 42(5), pp.429-437.
2078. Taigman, Y., Yang, M., Ranzato, M., and L. Wolf. "Deepface: Closing the gap to human-level performance in face verification." www.cs.toronto.edu/~ranzato/publications/taigman_cvpr14.pdf
2079. Talaei, A., Hedjazi, A., Rezaei Ardani, A., Fayyazi Bordbar, M.R. and Talaei, A., 2014. The relationship between meteorological conditions and homicide, suicide, rage, and psychiatric hospitalization. Journal of forensic sciences, 59(5), pp.1397-1402.
2080. Tamuli, R.P., Patowary, A.J., Sarmah, S., 2013. Morphology and multi-elemental analysis leading to detection of gunshot wounds. Medico-Legal update, 13(1), pp.89-94.
2081. Thompson, S.G. *Cops in Lab Coats: Curbing Wrongful Convictions through Independent Forensic Laboratories.* Carolina Academic Press (2015).
2082. Thompson, W. C., "Interpretation: Observer Effects," in Wiley Encyclopedia of Forensic Sciences, A. Moenssens and A. Jamieson, Eds. Chichester, UK: John Wiley & Sons, 2009, pp. 1575-1579.
2083. Thompson, W.C. "The Myth of Infallibility", In Sheldon Krimsky & Jeremy Gruber (Eds.) *Genetic Explanations: Sense and Nonsense* , Harvard University Press (2013).
2084. Thompson, W.C. and Cole, S.A., Psychological aspects of forensic identification evidence. In M. Costanzo, D. Krauss & K. Pezdek (Eds.) Expert Psychological Testimony for the Courts. New York: Lawrence Erlbaum & Associates. 2007.
2085. Thompson, W.C., Newman, E.J., 2015. Lay Understanding of forensic statistics: evaluation of random match probabilities, likelihood rations and verbal equivalents. Law and Human Behavior, 39(4), pp.332-349.
2086. Thompson, W.C., Observer Effects, Context Effects and Confirmation Bias in Forensic Science in Wiley Encyclopedia of Forensic Science, Eds. Jamieson, A., and Moenssens, A., John Wiley & Sons, 2009.
2087. Thomson M.A., Bias and quality control in forensic science; a cause for concern. J Forensic Sci, 10(3), 1974.
2088. Toso, B. & Girod A. (1997, September). Evolution of random characteristics (appearance and disappearance). Presentation conducted at the First European Meeting of Forensic Science, Lausanne, Switzerland.

2089. Tversky, A. (1977). Features of similarity. Psychological Review, 84, 327–352.
2090. U.S. Department of Justice, National Institute of Justice. “Report Forensic Science: Fiscal Year 2015 Funding for DNA Analysis, Capacity Enhancement and Other Forensic Activities.” 2016.
2091. Weech, T.L. and H. Goldhor. "Obtrusive versus unobtrusive evaluation of reference service in five Illinois public libraries: A pilot study." *Library Quarterly: Information, Community, Policy*, Vol. 52, No. 4 (1982): 305-24.
2092. Weidner, C.I., Lin, Q., Koch, C.M., Eisele, L., Beier, F., Ziegler, P., Bauerschlag, D.O., Jockel, K., Erbel, R., Muhleisen, T.W., Zenke, M., Brummerndorf, T.H., Wagner, W., 2014. Aging of blood can be tracked by DNA methylation changes at just three CpG sites. Genome Biology, 15:R24.
2093. Weyermann, C., Bucher, L., Majcherczyk, P., Mazzella, W., Roux, C., Esseiva, P., 2012. Statistical discrimination of black gel pen inks analysed by laser desorption/ionization mass spectrometry. Forensic Science International, 217, pp.127-133.
2094. Whitman, G., Koppl, R., “Rational bias in forensic science,” Law, Probability & Risk, vol. 9 (1), pp. 69-90, 2010.
2095. Williams AR, Williams GF; 1993 -The invisible image- a tutorial on photography with invisible radiation, part 1: introduction and reflected ultraviolet techniques; J Biological Photography, 61(4).
2096. Williams R, Williams G, Infrared Photography, Medical and Scientific Photography: An Online Resource for Doctors, Scientists, and Students: http://msp.rmit.edu.au/Article_03/02d.html
2097. Williams R, Williams G; 1994 - “The invisible image-A Tutorial on Photography with Invisible Radiation, Part 2: Fluorescence Photography,” J Biological Photography, 62(1).
2098. Willis, S.M., McKenna, L., McDermott, S., O’Donell, G., Barrett, A., Rasmusson, B., Nordgaard, A., Berger, C.E.H., Sjerps, M.J., Lucena-Molina, J. and Zadora, G., 2015. ENFSI guideline for evaluative reporting in forensic science. European Network of Forensic Science Institutes.
2099. Wu, Y., Zhou, C.X., Yu, J, Liu, H.L., Xie, M.X., 2012. Differentiation and dating of gel pen ink entries on paper by laser desorption ionization- and quadruple-time of flight mass spectrometry. Dyes and Pigments, 94(3), pp.525-532.
2100. Yi Tang, Sargur N. Srihari, Harish Kasiviswanathan and Jason J. Corso. COMPUTATIONAL FORENSICS: Lecture Notes in Computer Science, 2011, Volume 6540/2011, 88-100, DOI: 10.1007/978-3-642-19376-7_8