

Towards a Common Body of Knowledge for Forensic Genetics: the Most Valuable Publications List and the INTERPOL DNA Reviews

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Abstract

An effort to identify and describe some of the most valuable publications (MVPs) in forensic genetics has been made with the initial 2021 MVP list containing almost 500 informative publications across 26 topic categories. MVP lists were revised in 2022 and 2024 with fewer citations. These lists have been informed by two INTERPOL reviews on forensic biology and forensic DNA typing published in 2020 and 2023.

Keywords

Forensic biology, forensic DNA, forensic genetics, training resources.

1. Introduction

Effective training and continuing education are crucial to keep up with evolving forensic genetics technologies and applications. Forensic laboratories invest in the continuing education of their staff. Universities with forensic science programs seek to prepare their students to be future contributing practitioners and researchers. Stakeholders in the criminal justice system (e.g., law enforcement personnel, lawyers, and judges) using DNA results also benefit from regular training and continuing education to understand capabilities and limitations of methods and

practices. Almost 100 books on forensic genetics have been published since 1990 including six by the author [1].

An agreed-upon common body of knowledge in forensic genetics benefits practitioners, students, and stakeholders [2]. Thousands of publications in dozens of peer-reviewed journals exist on the topic of forensic genetics – and information in this field grows with each passing year due to many active research efforts. This ever-growing body of scientific literature becomes increasingly challenging to monitor, much less incorporate into forensic laboratory training programs. Regular updates on important advances and resources with helpful articles in specific areas of interest to forensic DNA casework can assist DNA technical leaders and analysts.

2. Creating MVP Lists

Over the past several decades, INTERPOL has organized a triennial symposium for forensic science managers to discuss important advances. Review articles on select forensic disciplines are prepared by invited experts and presented to those in attendance. The last two sets of reviews have been published as special issues in an open-access format with the journal *Forensic Science International: Synergy* [3]. These reviews have covered the topics of fingerprints and other body impressions; paint, tape, and glass evidence; fibers and textiles; fire debris and fire investigation; firearm examination; toxicology; questioned documents; forensic management; drug analysis; gunshot residue; forensic video analysis; explosives; digital evidence; and forensic biology and DNA typing.

The author was invited by the INTERPOL symposium organizers to prepare the two most recent reviews on forensic genetics (biology and DNA), where 235 articles from 35 journals across 12 topics were discussed in the 2016-2019 review [4] and 773 articles from 96 journals across 15 topics with the 2019-2022 review [5]. Efforts in gathering hundreds of articles and studying the literature for the field inspired a desire to create a list of impactful information – the most valuable publications (MVPs).

Input on the MVPs came through activities of the Organization of Scientific Area Committees (OSAC) for Forensic Science and the Scientific Working Group on DNA Analysis Methods (SWGDM). The initial MVP list contained almost 500 informative publications across 26 topic categories and was introduced in a 2021 workshop at the American Academy of Forensic Sciences (AAFS). Additional MVP lists have evolved and been somewhat more focused as other presentations were given and feedback was received. These reference lists build upon information cited

in the July 2020 SWGDAM Training Guidelines [6] and were revised in 2022 and 2024 in conjunction with presentations at various conferences [7]. The categories and the MVP reference lists created so far can be improved upon, and suggestions for additional references and categories are welcome.

3. MVP Topics and Organization

Table 1 lists the 26 topics and the number of articles in each category or group for the three MVP lists created so far in 2021, 2022, and 2024. Within each group (listed arbitrarily from A to Z), a #1 MVP article was selected, which is often an ISFG DNA Commission article, and then followed by reference citations, which are not ranked further, defined by date in ascending order with the most recent publications at the end of each category. This letter and number system (e.g., A1, B3, W7) provides a simple method to locate specific articles in each MVP list and enables opportunities for expansion as the literature grows. Although some articles could logically appear under multiple categories, no duplicate listings were used.

Table 1. The most valuable publications (MVP) topics covered in 26 groups (categories) along with the number of articles present in each category for the three lists created in 2021, 2022, and 2024.

Group (Category)	Most Valuable Publications Topic(s) Covered https://strbase.nist.gov/Information/Most_Valuable_Publications	480 (2021)	85 (2022)	92 (2024)
A	Plain Language Guides to Forensic DNA Analysis	4	2	3
B	Serology and Body Fluid Identification	24	3	3
C	Collection and Storage of Biological Material	25	2	2
D	DNA Extraction/Purification, Differential Extraction	18	2	2
E	DNA Quantitation, Degraded DNA	10	2	2
F	PCR Amplification, Inhibition, and Artifacts	13	3	3
G	Capillary Electrophoresis Separation and Detection	12	2	2
H	Assessing Sample Suitability & Complexity, Low-Template	7	2	2
I	Estimating the Number of Contributors	12	4	4
J	Data Interpretation, Mixture Deconvolution, and Interlaboratory Studies	12	4	5
K	Interpretation: Binary Approaches (CPI, RMP, LR)	11	5	5
L	Interpretation: Probabilistic Genotyping Software	44	4	6

M	Report Writing and Technical Review	8	4	4
N	Court Testimony, Communication, Juror Comprehension	22	5	5
O	Autosomal STR Markers and Kits	29	2	2
P	Mitochondrial DNA Testing	11	3	3
Q	Y-Chromosome and X-Chromosome Testing	17	4	4
R	DNA Databases and Investigative Genetic Genealogy	14	3	3
S	Statistical Analysis	11	2	2
T	Population Genetics	11	2	2
U	DNA Phenotyping (Ancestry, Appearance, Age)	24	2	2
V	New Technologies (Rapid DNA, Massively Parallel Sequencing)	35	5	5
W	DNA Transfer and Activity Level Reporting	57	8	10
X	Non-Human DNA Testing	15	2	2
Y	Method Validation, Quality Control, and Human Factors	23	5	5
Z	General Forensic Science Topics	11	3	4

4. Conclusion

The NIST STRBase website now includes past and present MVP lists as well as associated presentations [7]. The MVP lists are not intended to be additive (i.e., using 2021 + 2022 + 2024), and some of the best references are retained over time as new ones are added and some removed. Interested users are encouraged to use the most recent version – with the ability to access previous versions as desired. Note that some years (e.g., 2023) may not have an updated MVP list.

Ideally, in the future a group of informed researchers and practitioners would build upon this effort and create revised MVP lists every year to evolve with advances in the field. Of course, any selection of best articles is going to be subjective and not comprehensive.

5. Acknowledgments and Disclaimer

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6. Conflict of interest statement

There are no conflicts of interest to report (the author does not receive royalties for his books).

7. References and Notes

- [1] The author's *Forensic DNA Typing* books were published in 2001, 2005, 2009, 2011, 2014, and 2022.
- [2] Based on deliberations and discussions of NIST team members and Resource Group in connection with the scientific foundation review on DNA Mixture Interpretation (NISTIR 8351-draft, Appendix 2); see also *Forensic DNA Interpretation and Human Factors: Improving Practice Through a Systems Approach*, Chapter 9 "Education, Training, and Professional Credentialing", pp. 241-274. <https://doi.org/10.6028/NIST.IR.8503>
- [3] Interpol special issues in *Forensic Science International: Synergy*: (2016-2019) <https://www.sciencedirect.com/special-issue/10QWNF78TVR> (2019-2022) <https://www.sciencedirect.com/special-issue/109JLJCFP14>
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- [6] SWGDAM Training Guidelines (2020) Available at <https://www.swgdam.org/publications>
- [7] See https://strbase.nist.gov/Information/Most_Valuable_Publications