

The VersaPlex™ 27PY System- A New Promega Six-dye Multiplex for Casework

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1. Introduction

The VersaPlex™ 27PY System is a 6-color, 27-locus STR system for simultaneously amplifying and genotyping 23 autosomal loci, three Y-STR loci, and Amelogenin. It is intended for forensic casework or kinship STR analysis in regions that prefer the D6S1043 locus. In addition to D6S1043, the autosomal loci are CSF1PO, FGA, TH01, TPOX, vWA, D1S1656, D2S441, D2S1338, D3S1358, D5S818, D7S820, D8S1179, D10S1248, D12S391, D13S317, D16S539, D18S51, D19S433, D21S11, D22S1045, Penta D, and Penta E. These loci offer Probability of Identity (P_i) values of 4.4 x 10⁻³⁰ for four combined American populations and 6.2 x 10⁻²⁷ for the Asian American population [1].

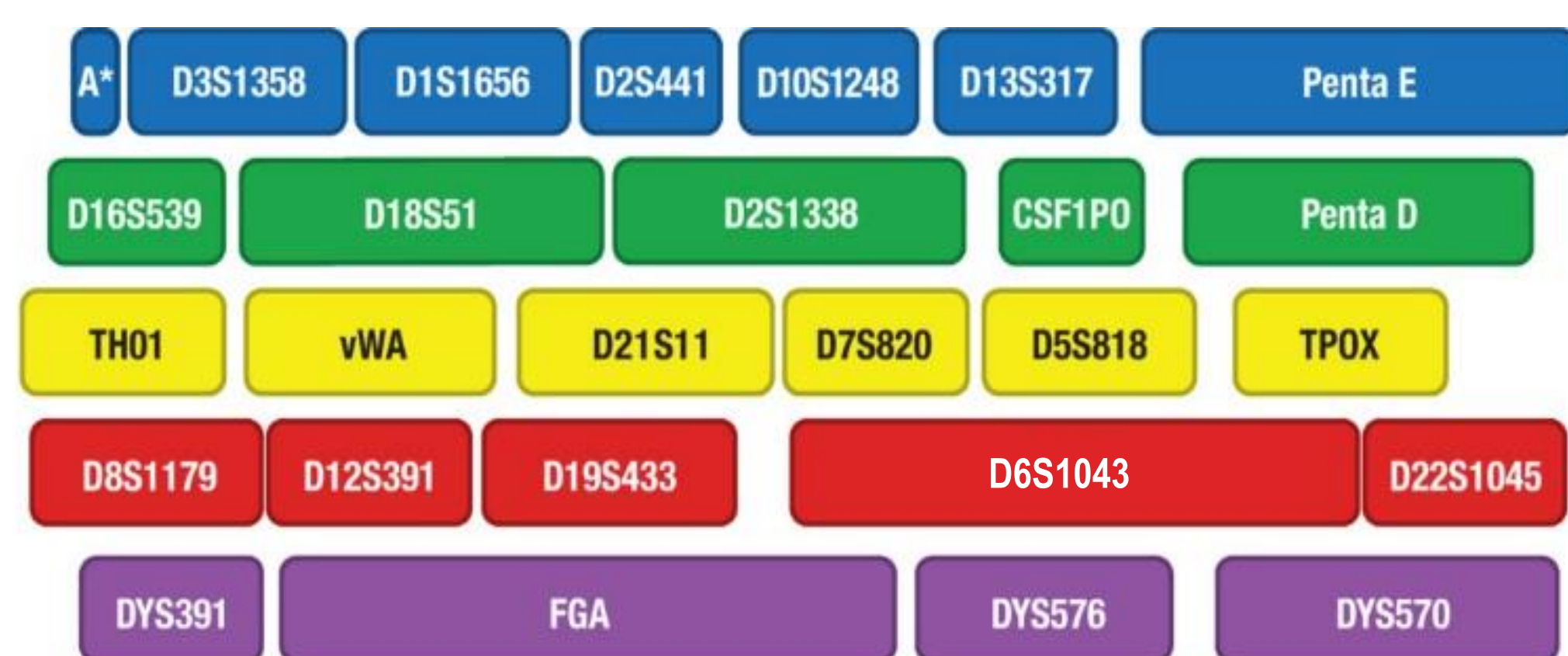
This 27-locus STR system will be the only D6S1043-containing multiplex that includes multiple Y-STR loci. Like the expanded CODIS-compliant kits, the DYS391 locus is included for gender-verification of Amelogenin-null samples. Additionally, two Y-STR loci with high gene diversity values [2], DYS570 and DYS576, are included. These three Y-STR loci allow more confident determination of the number of male contributors in complex mixtures.

While designed for an optimal input DNA amount of 1ng, the system is sensitive to low DNA input amounts and is robust against high concentrations of PCR inhibitors. Additionally, nine loci are under 200bp, making it useful for degraded samples. This poster includes preliminary data highlighting the kit's capabilities.

[1] C. R. Steffen, M. D. Coble, K. B. Gettings and P. M. Vallone, "Corrigendum to 'U.S. Population Data for 29 Autosomal STR Loci' [Forensic Sci. Int. Genet. 7 (2013) e82–e83]." *Forensic Science International: Genetics*, pp. e36–e40, 2017.

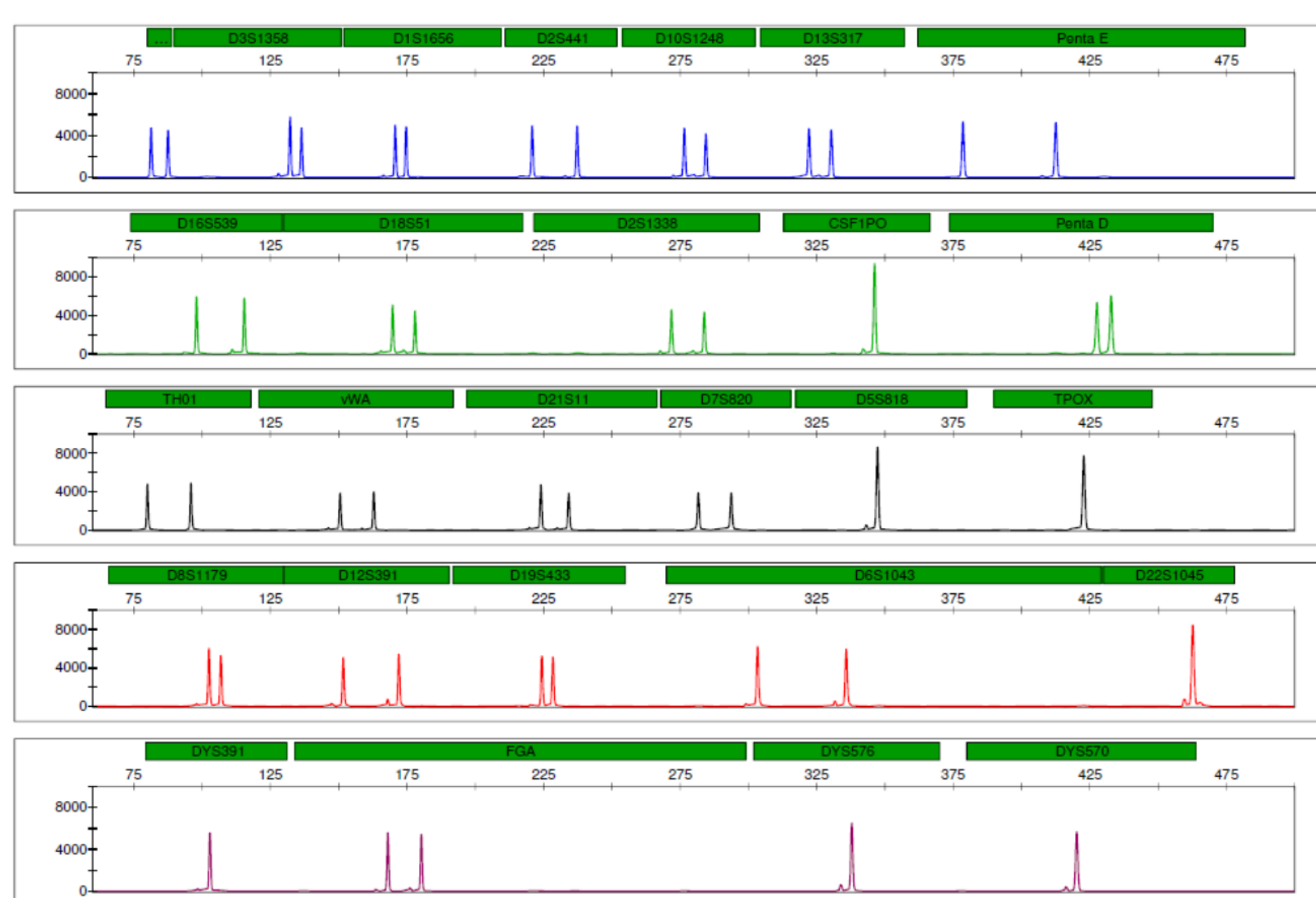
[2] J. Purps and L. Roewer, "A global analysis of Y-chromosomal haplotype diversity for 23 STR loci," *Forensic Science International: Genetics*, pp. 12–23, 2014.

2. VersaPlex™ 27PY System



3. Amplification of 1ng Purified Human Genomic DNA

1ng of human genomic DNA was amplified for 29 cycles. Amplified samples were separated on a 3500xL Genetic Analyzer using a 1.2kV 24sec injection, 13kV run voltage and 1500sec run time. Data were analyzed with GeneMapper® ID-X software.

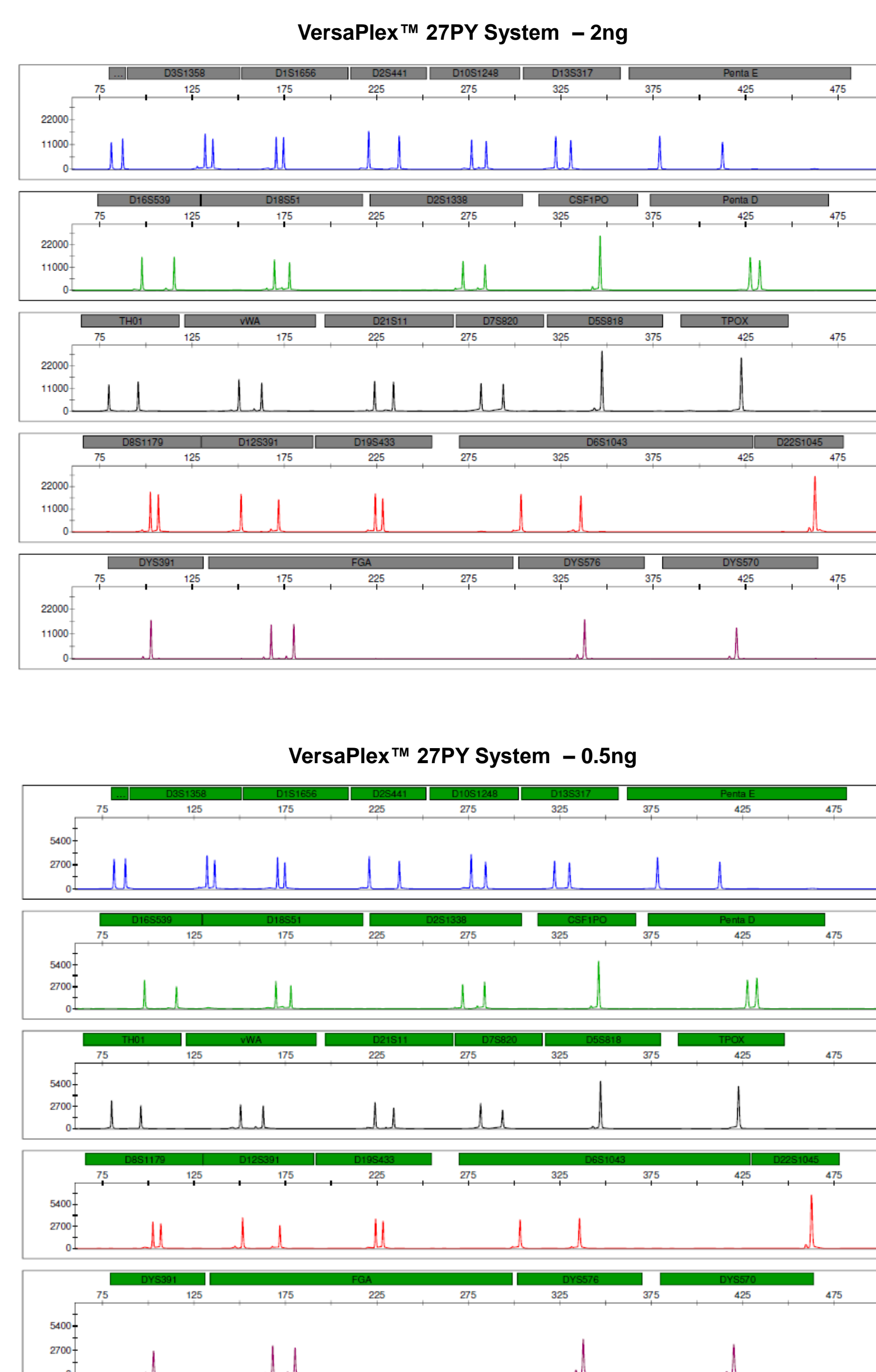


4. Flexible Input Amounts

Electropherograms of the VersaPlex™ 27PY System. Amplified samples were separated on a 3500xL Genetic Analyzer using a 1.2kV 24sec injection, 13kV run voltage and 1500sec run time. Data were analyzed with GeneMapper® ID-X software.

The VersaPlex™ 27PY System generated a complete, balanced profile at twice the recommended input DNA concentration and at half of the recommended input DNA concentration.

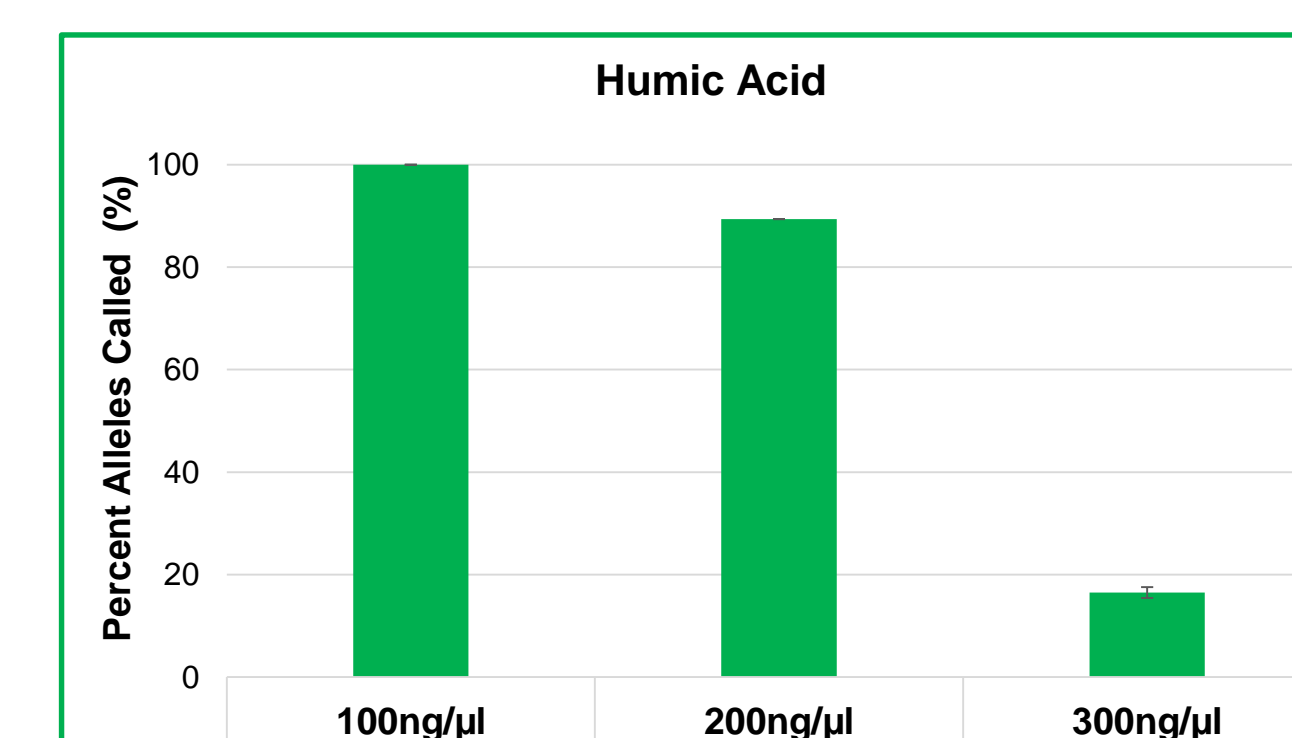
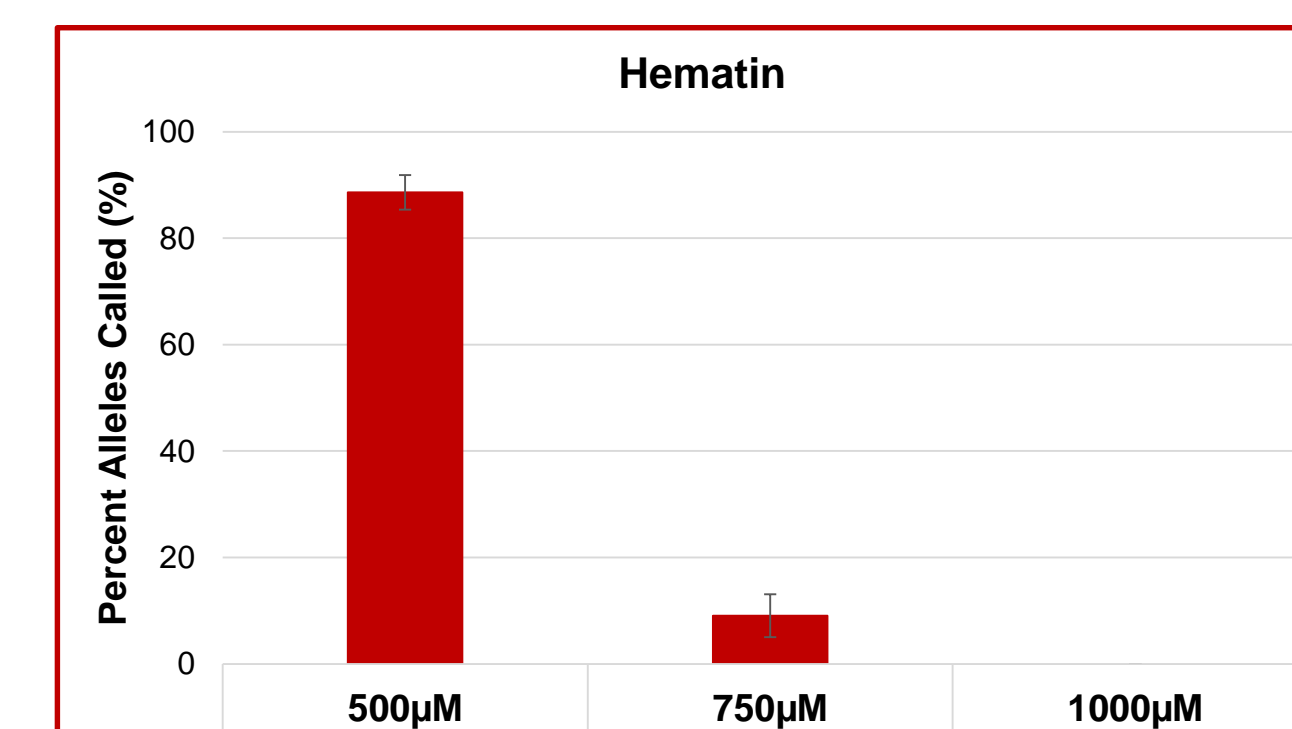
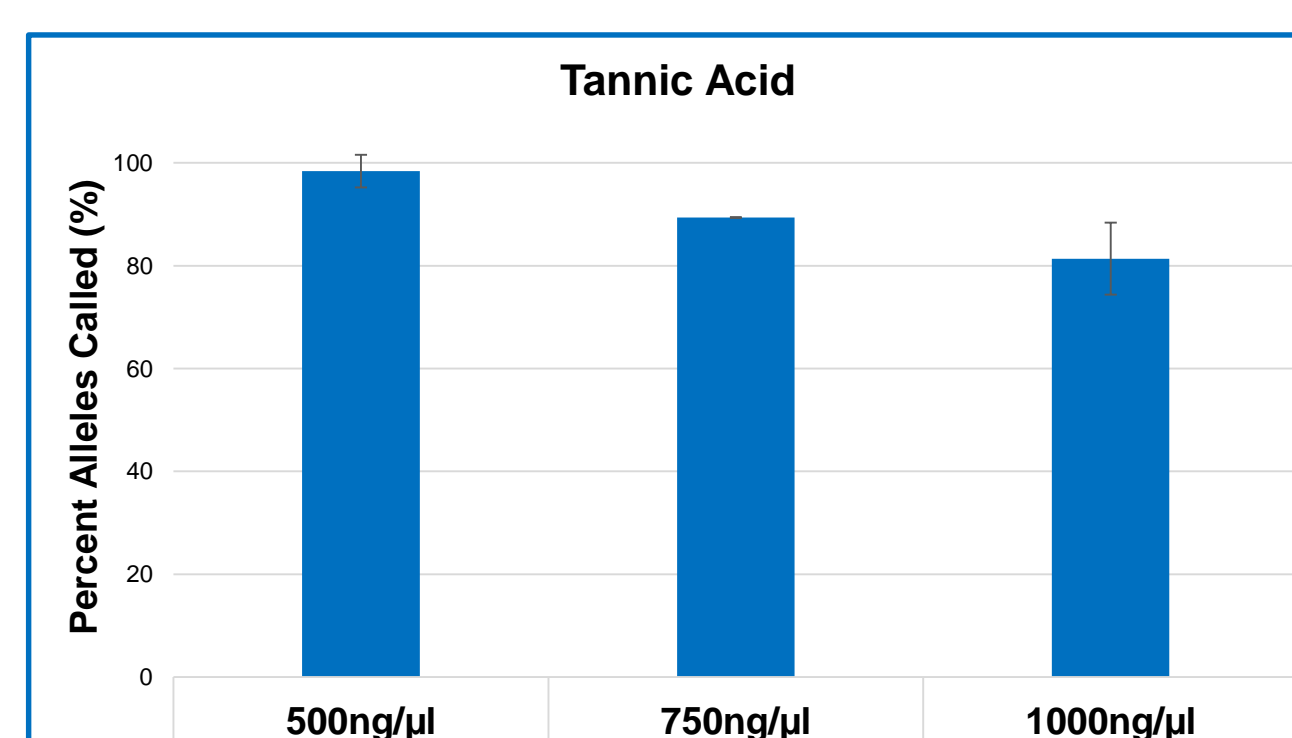
	VersaPlex™ 27PY
Optimal target amount	1.0ng
Number of cycles	29
Cycling profile	1-stage
Amplification time	~70 min



5. Inhibitor Tolerance

Hematin, Tannic Acid or Humic Acid was added to reactions with 1ng extracted DNA and amplified for 29 cycles. Amplified samples were separated on a 3500xL Genetic Analyzer using a 1.2kV 24sec injection, 13kV run voltage and 1500sec run time. Data were analyzed with GeneMapper® ID-X software.

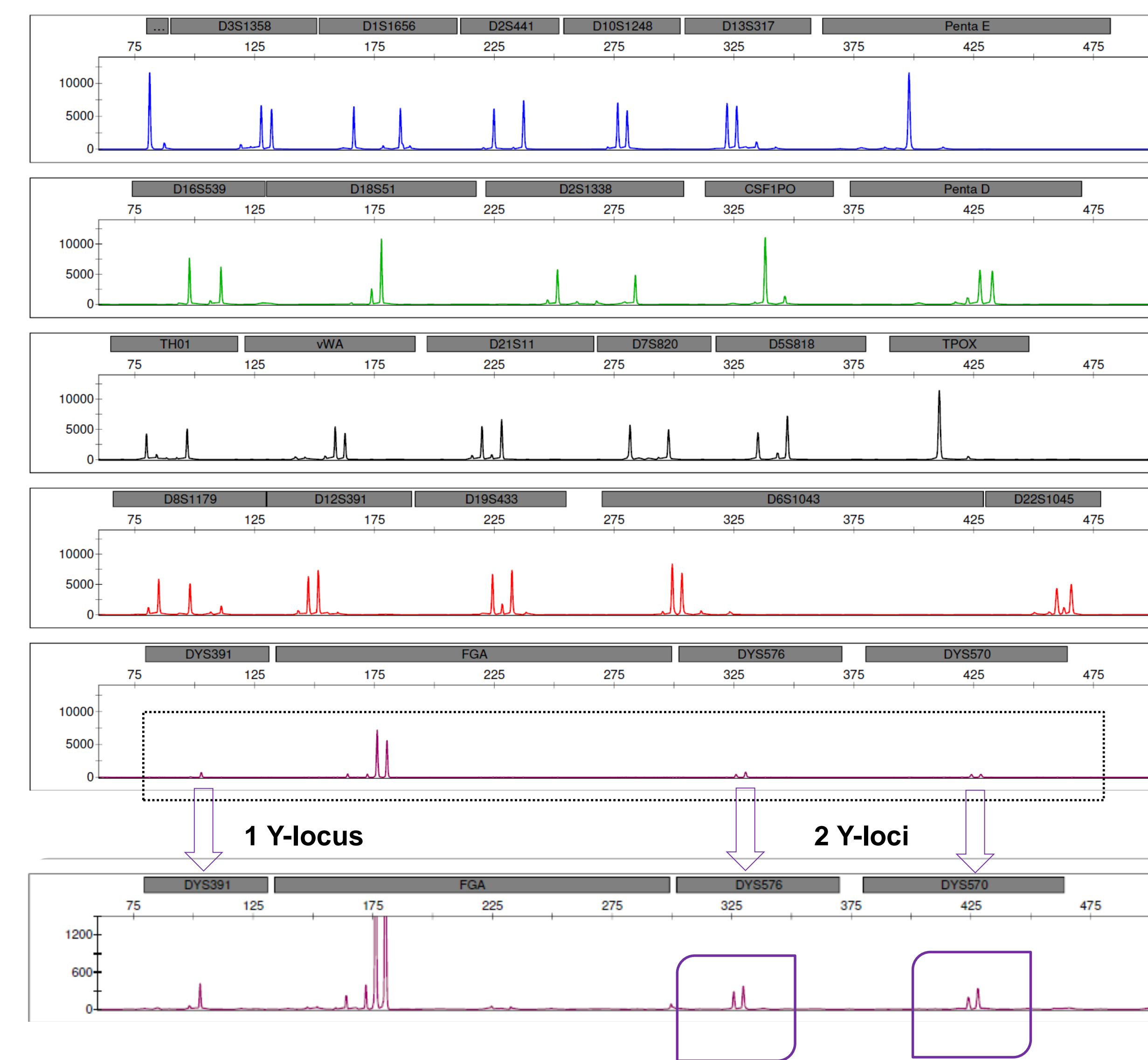
- Hematin (500µM, 750µM, 1000µM)
- Tannic Acid (500ng/µl, 750ng/µl, 1000ng/µl)
- Humic Acid (100ng/µl, 200ng/µl, 300ng/µl)



6. Amplification of a 1:1:20 Mixture

A complex three-person DNA mixture with 45pg each of two different minor male contributors and one major female contributor (1ng total) was amplified for 29 cycles. Amplified samples were separated on a 3500xL Genetic Analyzer using a 1.2kV 24sec injection, 13kV run voltage and 1500sec run time. Data were analyzed with GeneMapper® ID-X software.

At locus DYS391, both male contributors have the same allele. Conversely both the DYS576 and DYS570 loci indicate that there are two male contributors, demonstrating how the inclusion of the Y-STR loci in the VersaPlex™ 27PY System can assist in mixture interpretation.



7. VersaPlex™ 27PY System Summary

- A 6 color STR system used to amplify 27 total loci, including D6S1043 and 3 Y-STRs for challenging casework samples
- Balanced at 1ng, but capable of handling a wide range of input amounts
- Achieve superior results in less time
- Sensitivity is comparable to other commercially available STR multiplexes
- Robust amplification even in the presence of inhibitors
- Y-STRs allow more confident determination of the number of male contributors in complex mixtures