

Meet the New Loci

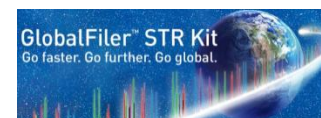
- General information
 - Chromosomal location
 - Repeat motif
 - Allele range and number of alleles

Reported in the literature and summarized in Appendix 1, J.M. Butler (2011) Advanced Topics in Forensic DNA Typing: Methodology

- Population statistics using NIST 1036 data set
 - Observed alleles, genotypes and heterozygosity
 - Probability of Identity values
 - Allele frequencies

Hill, C.R., Duewer, D.L., Kline, M.C., Coble, M.D., Butler, J.M. (2013) U.S. population data for 29 autosomal STR loci. Forensic Sci. Int. Genet. 7: e82-e83.

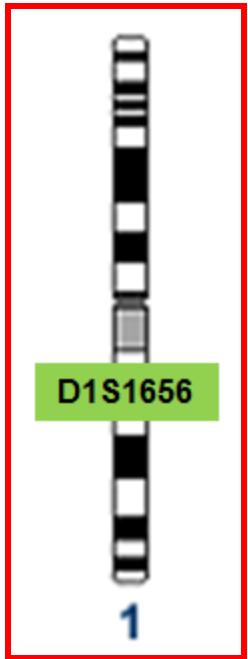
- STR Multiplex Kits
 - Marker position: size and color



Meet the New Loci...

D1S1656

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D1S1656	1q42	TAGA	8 to 20.3	25



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
15	93
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.8890	0.0224

U.S. Population Allele Frequencies

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
10	0.0146	0.0000	0.0028	0.0064
11	0.0453	0.0309	0.0776	0.0275
12	0.0643	0.0464	0.1163	0.0890
13	0.1009	0.1340	0.0665	0.1144
14	0.2573	0.0619	0.0789	0.1165
14.3	0.0073	0.0000	0.0028	0.0042
15	0.1579	0.2784	0.1496	0.1377
15.3	0.0292	0.0000	0.0582	0.0508
16	0.1096	0.2010	0.1357	0.1758
16.3	0.1023	0.0155	0.0609	0.0508
17	0.0278	0.0722	0.0471	0.0424
17.3	0.0497	0.0876	0.1330	0.1483
18	0.0029	0.0155	0.0055	0.0064
18.3	0.0234	0.0515	0.0499	0.0254
19.3	0.0073	0.0052	0.0152	0.0042

15 different alleles

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	SID	Purple	154-209
PowerPlex Fusion	Fluorescein	Blue	151-207
PowerPlex Fusion 6C	FL-6C	Blue	152-209
Investigator 24plex QS	BTG	Green	155-201

Meet the New Loci... D2S441



STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D2S441	2p14	TCTA/TCAA	8 to 17	22

Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
15	43
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.7828	0.0841

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	NED	Yellow	75-113
PowerPlex Fusion	Fluorescein	Blue	208-247
PowerPlex Fusion 6C	FL-6C	Blue	211-252
Investigator 24plex QS	BTR	Red	79-133

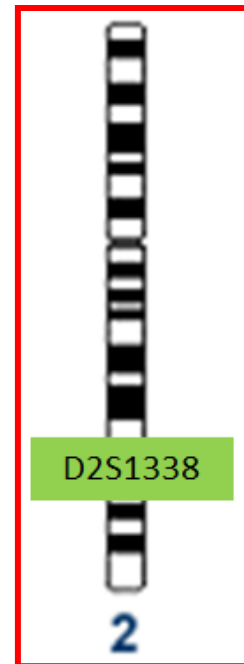
U.S. Population Allele Frequencies

15 different alleles

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
8.0	0.0000	0.0052	0.0000	0.0000
9.0	0.0029	0.0000	0.0014	0.0000
9.1	0.0000	0.0052	0.0014	0.0000
10.0	0.0848	0.2680	0.2105	0.3369
11.0	0.3626	0.3505	0.3435	0.2987
11.3	0.0439	0.0309	0.0609	0.0445
12.0	0.1652	0.2165	0.0471	0.0360
12.3	0.0058	0.0052	0.0042	0.0021
13.0	0.0439	0.0258	0.0291	0.0233
13.3	0.0029	0.0000	0.0000	0.0000
14.0	0.2675	0.0825	0.2410	0.2055
14.3	0.0015	0.0000	0.0000	0.0000
15.0	0.0190	0.0103	0.0596	0.0487
16.0	0.0000	0.0000	0.0014	0.0021
17.0	0.0000	0.0000	0.0000	0.0021

Meet the New Loci...

D2S1338



STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D2S1338	2q35	TGCC/TTCC	10 to 31	40

Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
13	68
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.8793	0.0220

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	SID	Purple	275-356
PowerPlex Fusion	JOE	Green	218-299
PowerPlex Fusion 6C	JOE-6C	Green	221-304
Investigator 24plex QS	BTY	Yellow	360-438

U.S. Population Allele Frequencies

13 different alleles

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
15.0	0.0015	0.0000	0.0014	0.0000
16.0	0.0556	0.0206	0.0374	0.0297
17.0	0.1009	0.0567	0.1856	0.1695
18.0	0.0424	0.1340	0.0734	0.0805
19.0	0.1389	0.1804	0.1205	0.1928
20.0	0.1038	0.1598	0.1565	0.1271
21.0	0.1360	0.0155	0.0374	0.0318
22.0	0.1374	0.0515	0.0346	0.0572
23.0	0.1038	0.1649	0.1053	0.1398
24.0	0.0833	0.1289	0.1150	0.0763
25.0	0.0775	0.0464	0.1025	0.0784
26.0	0.0146	0.0361	0.0305	0.0169
27.0	0.0044	0.0052	0.0000	0.0000

Meet the New Loci... D10S1248

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D10S1248	10q26.3	GGAA	7 to 19	13



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
12	39
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.7819	0.0845

U.S. Population Allele Frequencies

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
8.0	0.0029	0.0000	0.0000	0.0000
9.0	0.0029	0.0000	0.0000	0.0000
10.0	0.0073	0.0052	0.0000	0.0000
11.0	0.0351	0.0000	0.0014	0.0042
12.0	0.1301	0.0876	0.0319	0.0424
13.0	0.2339	0.3196	0.3075	0.2733
14.0	0.2763	0.2526	0.2978	0.3390
15.0	0.1974	0.2062	0.1967	0.2119
16.0	0.0877	0.0979	0.1330	0.0996
17.0	0.0249	0.0309	0.0277	0.0254
18.0	0.0015	0.0000	0.0014	0.0021
19.0	0.0000	0.0000	0.0028	0.0021

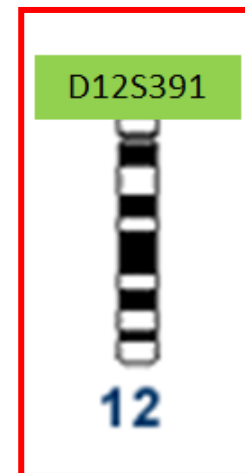
12 different alleles

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	SID	Purple	80-132
PowerPlex Fusion	Fluorescein	Blue	248-295
PowerPlex Fusion 6C	FL-6C	Blue	254-302
Investigator 24plex QS	BTY	Yellow	83-143

Meet the New Loci... D12S391

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D12S391	12p13.2	AGAT/AGAC	13 to 27.2	52



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
24	113
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.8813	0.0271

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	SID	Purple	211-270
PowerPlex Fusion	CXR-ET	Red	131-191
PowerPlex Fusion 6C	CXR-6C	Red	130-190
Investigator 24plex QS	BTG	Green	203-265

U.S. Population Allele Frequencies

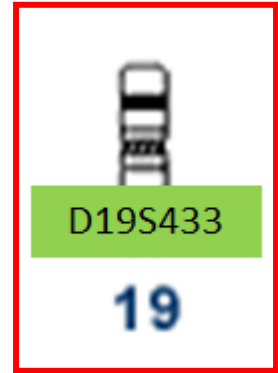
Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
14.0	0.0015	0.0000	0.0000	0.0000
15.0	0.0775	0.0412	0.0319	0.0445
16.0	0.0673	0.0103	0.0222	0.0424
17.0	0.1667	0.0825	0.1274	0.0763
17.1	0.0044	0.0000	0.0000	0.0000
17.3	0.0044	0.0000	0.0208	0.0169
18.0	0.2529	0.2629	0.1717	0.1780
18.1	0.0015	0.0000	0.0000	0.0000
18.3	0.0044	0.0000	0.0249	0.0127
19.0	0.1477	0.1753	0.1247	0.1886
19.1	0.0088	0.0000	0.0000	0.0021
19.3	0.0044	0.0052	0.0042	0.0064
20.0	0.1038	0.1959	0.1108	0.1547
20.1	0.0029	0.0000	0.0000	0.0000
20.3	0.0000	0.0000	0.0000	0.0021
21.0	0.0643	0.0979	0.1288	0.1123
22.0	0.0365	0.0567	0.0956	0.0678
22.2	0.0000	0.0000	0.0000	0.0021
23.0	0.0292	0.0258	0.0693	0.0572
24.0	0.0132	0.0103	0.0471	0.0169
24.3	0.0000	0.0052	0.0000	0.0000
25.0	0.0088	0.0155	0.0166	0.0064
26.0	0.0000	0.0103	0.0028	0.0064
27.0	0.0000	0.0052	0.0014	0.0064

24 different alleles

Meet the New Loci...

D19S433

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D19S433	19q12	AAGG/TAGG	5.2 to 20	36



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
16	78
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.8118	0.0559

U.S. Population Allele Frequencies

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
9.0	0.0000	0.0000	0.0000	0.0021
10.0	0.0102	0.0000	0.0014	0.0021
11.0	0.0629	0.0000	0.0055	0.0148
12.0	0.1228	0.0361	0.0706	0.0657
12.2	0.0365	0.0258	0.0014	0.0127
13.0	0.2456	0.2835	0.2548	0.2225
13.2	0.0526	0.0206	0.0069	0.0445
14.0	0.2105	0.2990	0.3615	0.3538
14.2	0.0746	0.1031	0.0235	0.0381
15.0	0.0804	0.0619	0.1565	0.1356
15.2	0.0614	0.1237	0.0360	0.0551
16.0	0.0044	0.0103	0.0568	0.0254
16.2	0.0263	0.0309	0.0152	0.0275
17.0	0.0000	0.0000	0.0069	0.0000
17.2	0.0088	0.0052	0.0014	0.0000
18.2	0.0029	0.0000	0.0014	0.0000

16 different alleles

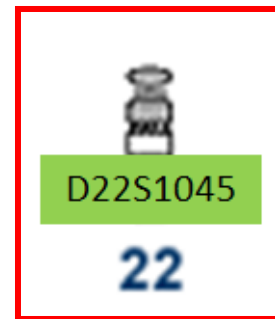
Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	NED	Yellow	115-173
PowerPlex Fusion	CXR-ET	Red	191-256
PowerPlex Fusion 6C	CXR-6C	Red	192-255
Investigator 24plex QS	BTY	Yellow	213-279

Meet the New Loci...

D22S1045

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
D22S1045	22q12.3	ATT	7 to 20	14



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
11	44
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.7606	0.0921

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	TAZ	Red	83-127
PowerPlex Fusion	CXR-ET	Red	420-472
PowerPlex Fusion 6C	CXR-6C	Red	430-478
Investigator 24plex QS	BTY	Yellow	144-191

U.S. Population Allele Frequencies

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
8.0	0.0073	0.0000	0.0000	0.0000
10.0	0.0409	0.0000	0.0000	0.0148
11.0	0.1447	0.2010	0.1399	0.0636
12.0	0.0541	0.0052	0.0125	0.0127
13.0	0.0029	0.0000	0.0069	0.0085
14.0	0.0775	0.0103	0.0568	0.0275
15.0	0.2515	0.3093	0.3213	0.4258
16.0	0.1915	0.2268	0.3823	0.3496
17.0	0.2091	0.2216	0.0748	0.0911
18.0	0.0146	0.0206	0.0055	0.0064
19.0	0.0058	0.0052	0.0000	0.0000

11 different alleles

Meet the New Loci... Penta D

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
Penta D	21q22.3	AAAGA	1.1 to 19	50



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
16	74
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.8552	0.0382

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
PowerPlex Fusion	JOE	Green	370-461
PowerPlex Fusion 6C	JOE-6C	Green	373-470

U.S. Population Allele Frequencies

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
2.2	0.1140	0.0000	0.0042	0.0169
3.2	0.0088	0.0000	0.0000	0.0021
5.0	0.0439	0.0000	0.0000	0.0064
6.0	0.0102	0.0103	0.0042	0.0021
7.0	0.0439	0.0000	0.0042	0.0021
8.0	0.1082	0.0052	0.0208	0.0191
9.0	0.1681	0.3144	0.2216	0.2415
10.0	0.0994	0.1856	0.1150	0.1568
11.0	0.1798	0.1804	0.1260	0.1568
12.0	0.1082	0.1804	0.2327	0.1631
13.0	0.0833	0.1031	0.1967	0.1441
13.4	0.0015	0.0000	0.0000	0.0000
14.0	0.0249	0.0103	0.0609	0.0720
15.0	0.0044	0.0103	0.0097	0.0106
16.0	0.0000	0.0000	0.0028	0.0042
17.0	0.0015	0.0000	0.0014	0.0021

16 different alleles

Meet the New Loci... Penta E



STR Locus	Location	Repeat Motif	Allele Range	# Alleles
Penta E	15q26.2	AAAGA	5 to 32	53

Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
23	138
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.8890	0.0224

U.S. Population Allele Frequencies

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
5.0	0.0950	0.0722	0.0762	0.0360
6.0	0.0015	0.0000	0.0000	0.0000
7.0	0.1038	0.0000	0.1690	0.1186
8.0	0.1667	0.0052	0.0139	0.0254
9.0	0.0512	0.0258	0.0125	0.0169
10.0	0.0468	0.0619	0.0859	0.0847
11.0	0.0643	0.1598	0.0873	0.0742
12.0	0.1287	0.0928	0.1994	0.1737
13.0	0.1038	0.0515	0.0859	0.0932
14.0	0.0687	0.0515	0.0623	0.0720
15.0	0.0556	0.1134	0.0429	0.0911
15.4	0.0000	0.0000	0.0014	0.0021
16.0	0.0409	0.0567	0.0512	0.0614
17.0	0.0439	0.0825	0.0485	0.0551
18.0	0.0161	0.0773	0.0332	0.0339
19.0	0.0073	0.0412	0.0152	0.0212
19.4	0.0000	0.0103	0.0000	0.0000
20.0	0.0044	0.0206	0.0097	0.0212
21.0	0.0000	0.0206	0.0028	0.0064
22.0	0.0000	0.0309	0.0014	0.0021
23.0	0.0000	0.0206	0.0000	0.0064
24.0	0.0000	0.0000	0.0014	0.0000
25.0	0.0015	0.0052	0.0000	0.0042

23 different alleles

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
PowerPlex Fusion	Fluorescein	Blue	354-475
PowerPlex Fusion 6C	FL-6C	Blue	362-482

Meet the New Loci... SE33

STR Locus	Location	Repeat Motif	Allele Range	# Alleles
SE33	6q14	AAAG*	3 to 49	178

*SE33 alleles have a complex repeat structure



Population Statistics using NIST 1036 data set

Alleles Observed	Genotypes Observed
52	304
Heterozygosity Observed	Probability of Identity (P_I) Value n=1036
0.9353	0.0066

52 different alleles

Allele	African American (n=342)	Asian (n=97)	Caucasian (n=361)	Hispanic (n=236)
6.3	0.0000	0.0000	0.0000	0.0021
7.0	0.0015	0.0000	0.0000	0.0000
10.2	0.0015	0.0000	0.0000	0.0000
11.0	0.0000	0.0000	0.0014	0.0000
11.2	0.0029	0.0000	0.0000	0.0000
12.0	0.0029	0.0000	0.0069	0.0042
12.2	0.0029	0.0000	0.0000	0.0042
13.0	0.0117	0.0000	0.0166	0.0085
13.2	0.0058	0.0000	0.0000	0.0000
14.0	0.0512	0.0000	0.0249	0.0275
14.2	0.0058	0.0000	0.0028	0.0021
15.0	0.0439	0.0103	0.0402	0.0360
15.2	0.0029	0.0000	0.0000	0.0064
16.0	0.0482	0.0309	0.0402	0.0699
16.2	0.0044	0.0000	0.0014	0.0000
16.3	0.0000	0.0000	0.0000	0.0042
17.0	0.0950	0.0309	0.0623	0.0763
17.2	0.0015	0.0000	0.0000	0.0000
17.3	0.0015	0.0000	0.0014	0.0042
18.0	0.1199	0.0619	0.0734	0.1102
19.0	0.1272	0.0619	0.0720	0.0890
19.2	0.0000	0.0000	0.0042	0.0064
20.0	0.0980	0.0928	0.0582	0.0487
20.2	0.0029	0.0155	0.0097	0.0042
21.0	0.0482	0.0515	0.0249	0.0169
21.2	0.0102	0.0258	0.0235	0.0169
22.0	0.0146	0.0155	0.0139	0.0148
22.2	0.0044	0.0412	0.0374	0.0212
23.0	0.0073	0.0103	0.0028	0.0000
23.2	0.0175	0.0464	0.0360	0.0233
24.0	0.0000	0.0000	0.0014	0.0000
24.2	0.0132	0.0619	0.0222	0.0233
25.2	0.0307	0.0567	0.0416	0.0233
26.0	0.0015	0.0000	0.0000	0.0000
26.2	0.0629	0.0722	0.0416	0.0742
27.0	0.0000	0.0000	0.0000	0.0021
27.2	0.0424	0.1031	0.0942	0.0763
27.3	0.0000	0.0000	0.0000	0.0021
28.2	0.0453	0.0773	0.0762	0.0678
28.3	0.0015	0.0000	0.0014	0.0000
29.2	0.0234	0.0619	0.0554	0.0614
30.0	0.0000	0.0000	0.0000	0.0021
30.2	0.0161	0.0361	0.0568	0.0403
31.0	0.0015	0.0000	0.0028	0.0000
31.2	0.0161	0.0258	0.0235	0.0127
32.0	0.0000	0.0000	0.0014	0.0000
32.2	0.0044	0.0103	0.0125	0.0106
33.0	0.0000	0.0000	0.0014	0.0021
33.2	0.0029	0.0000	0.0042	0.0042
34.0	0.0029	0.0000	0.0083	0.0000
34.2	0.0000	0.0000	0.0014	0.0000
36.0	0.0015	0.0000	0.0000	0.0000

U.S. Population Allele Frequencies

Locations in common U.S. STR kits

STR Multiplex Kit	Dye Label	Color	Size (bp)
GlobalFiler	TAZ	Red	306-444
PowerPlex Fusion 6C	CXR-6C	Red	270-429
Investigator 24plex QS	BTG	Green	272-434