

A Tale of Two Families

*A Report on the First Year's Results from
the VAN_TUYL Surname Project*



**Rory Van Tuyl
FTDNA Conference
November 11, 2012
Houston, TX**



For the text accompanying these slides, see:

<http://www.roryvantuyl.com/PDFs/Posted%20FTDNA%202012%20Text.pdf>

A Tale of Two Families

Van Tuyl



Van Tuyll van Serooskerken





tuyl

**Tuyl/Tuyl /Tuijl/Tuil –
A Small Village
on the River Waal
Origin of the
Family Name “Van Tuyl”**

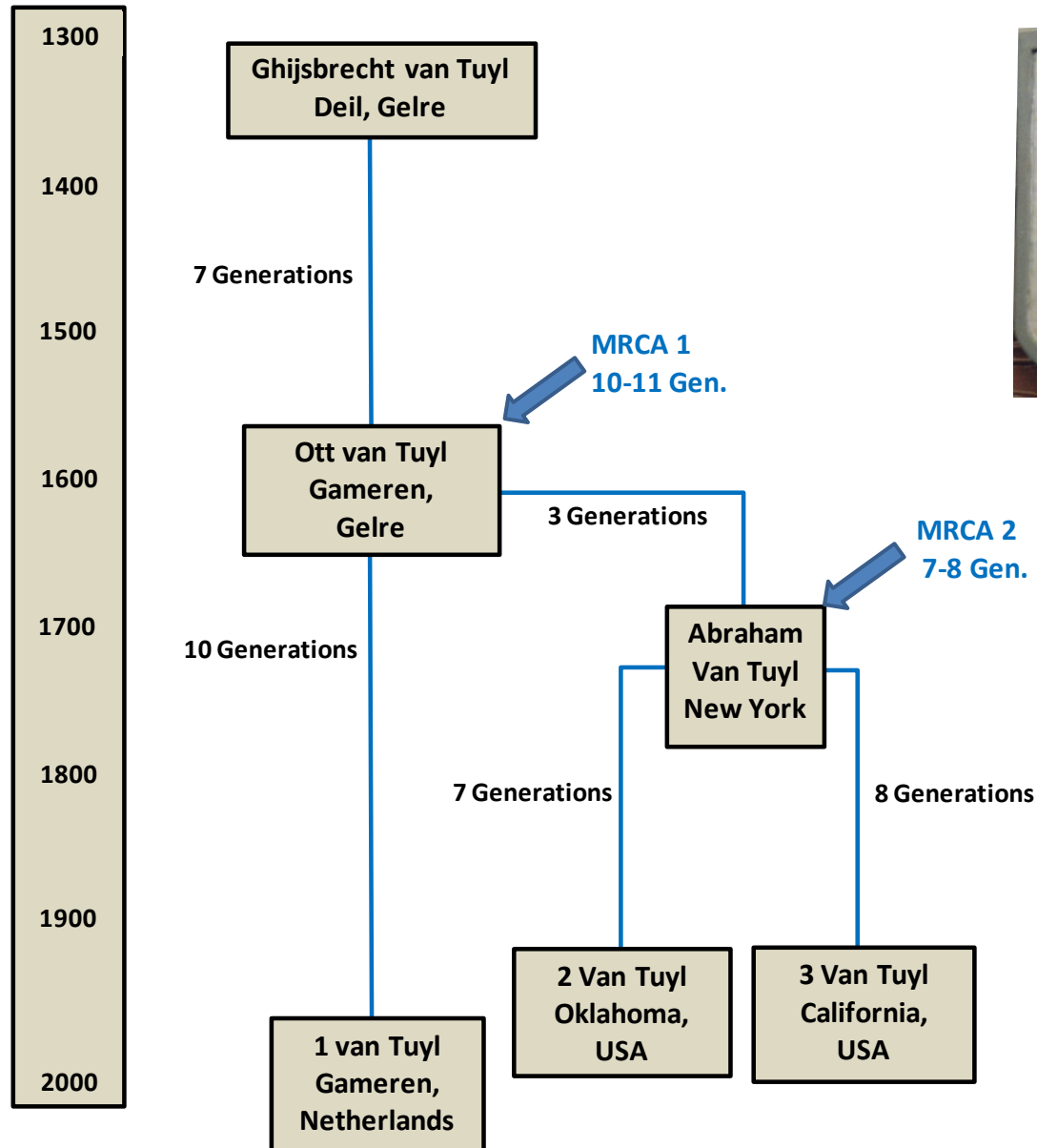


A Van Tuyl Chronicle

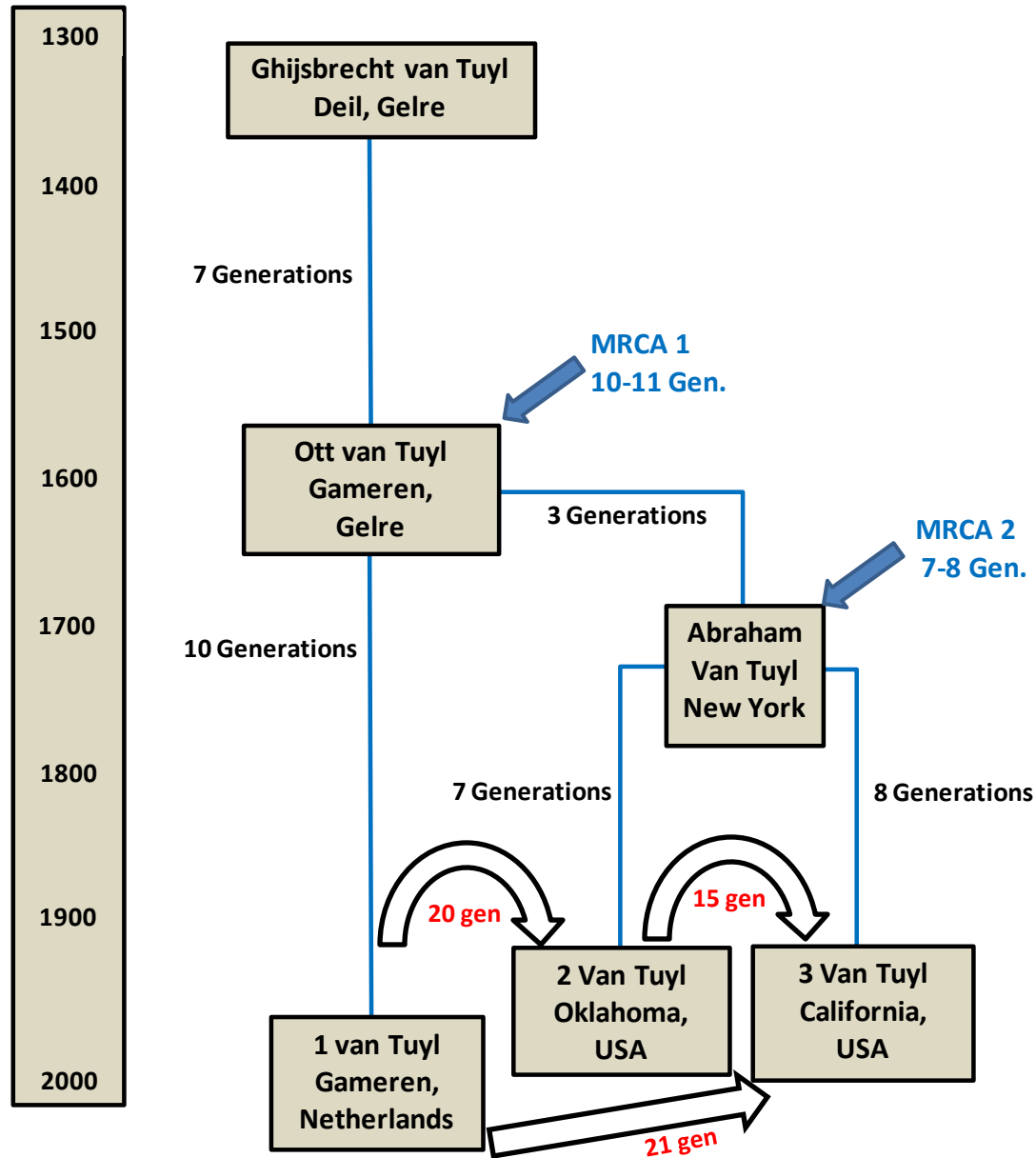
*650 Years in the History
of a
Dutch - American Family*

R. L. Van Tuyl & J. N. A. Groenendijk

Van Tuyl Records-Based Phylogeny



Van Tuyl Records-Based Phylogeny



67 Locus Mutation Results for 3 Van Tuyls Tested

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16



Different from Ancestral
Haplotype R1b1a2a1a1

Different from MRCA OVT

13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17



26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
3VT	11	11	19	23	15	15	19	18	38	38	12	13
2VT	11	11	19	23	15	15	18	18	38	39	12	13
1VT	11	11	19	23	15	15	18	18	38	38	12	13



38-52

Name	DYS531	DYS578	DYF395S1	DYF395S2	DYS590	DYS537	DYS641	DYS472	DYF406S1	DYS511	DYS425	DYS413a	DYS413b	DYS557	DYS594
3VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
2VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
1VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10

53-67

	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Name	DYS436	DYS490	DYS534	DYS450	DYS444	DYS481	DYS520	DYS446	DYS617	DYS568	DYS487	DYS572	DYS640	DYS492	DYS565
3VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
2VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
1VT	12	12	17	8	12	23	20	13	12	11	13	11	11	12	12



67 Locus Mutation Results for 3 Van Tuyls Tested

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16



	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17



	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-1	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
3VT	11				11	15	19	18	38	38	12	13
2VT	11				11	15	18	18	38	39	12	13
1VT	11				11	15	18	18	38	38	12	13



3VT
2VT
1VT

	31	32	33
	DYS607	DYS576	DYS570
3VT	15	19	18
2VT	15	18	18
1VT	15	18	18



	38	39	40	41	42	43	44	45	46	47	48	49	50
Name	DYS590	DYS537	DYS641	DYS472	DYF406S1	DYS511	DYS425	DYS413a	DYS413b	DYS557	DYS594		
3VT	8	10	10	8	10	10	12	22	23	15	10		
2VT	8	10	10	8	10	10	12	22	23	15	10		
1VT	8	10	10	8	10	10	12	22	23	15	10		

	57	58	59	60	61	62	63	64	65	66	67
Name	DYS481	DYS520	DYS446	DYS617	DYS568	DYS487	DYS572	DYS640	DYS492	DYS565	
3VT	12	23	20	13	12	11	13	11	11	12	12
2VT	12	23	20	13	12	11	13	11	11	12	12
1VT	12	23	20	13	12	11	13	11	11	12	12

FTDNA Differences –vs- Relationship Chart

	Y- DNA12	Y- DNA25	Y- DNA37	Y- DNA67
Very Tightly Related	N/A	N/A	0	0
Tightly Related	N/A	N/A	1	1-2
Related	0	0-1	2-3	3-4
Probably Related	1	2	4	5-6
Only Possibly Related	2	3	5	7
Not Related	3	4	6	>7

Y-STR Differences at 12, 25, 37, 67 Loci

	Y-DNA12	Y-DNA25	Y-DNA37	Y-DNA67
1 Van Tuyl to 2 Van Tuyl <i>20 Generations</i>	3	4	5	6
1 Van Tuyl to 3 Van Tuyl <i>21 Generations</i>	4	5	6	7
2 Van Tuyl to 3 Van Tuyl <i>15 Generations</i>	1	1	3	3

Red = Probably Not Related per FTDNA Charts

FTDNA Differences –vs- Relationship Chart

	Y-DNA12	Y-DNA25	Y-DNA37	Y-DNA67
Very Tightly Related	N/A	N/A	0	0
Tightly Related	N/A	N/A	1	1-2
Related	0	0-1	2-3	3-4
Probably Related	1	2	4	5-6
Only Possibly Related	2	3	5	7
Not Related	3	4	6	>7

67 Locus Mutation Results for 3 Van Tuyls Tested

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16



13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17



26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
3VT	11	11	19	23	15	15	19	18	38	38	12	13
2VT	11	11	19	23	15	15	18	18	38	39	12	13
1VT	11	11	19	23	15	15	18	18	38	38	12	13



38-52

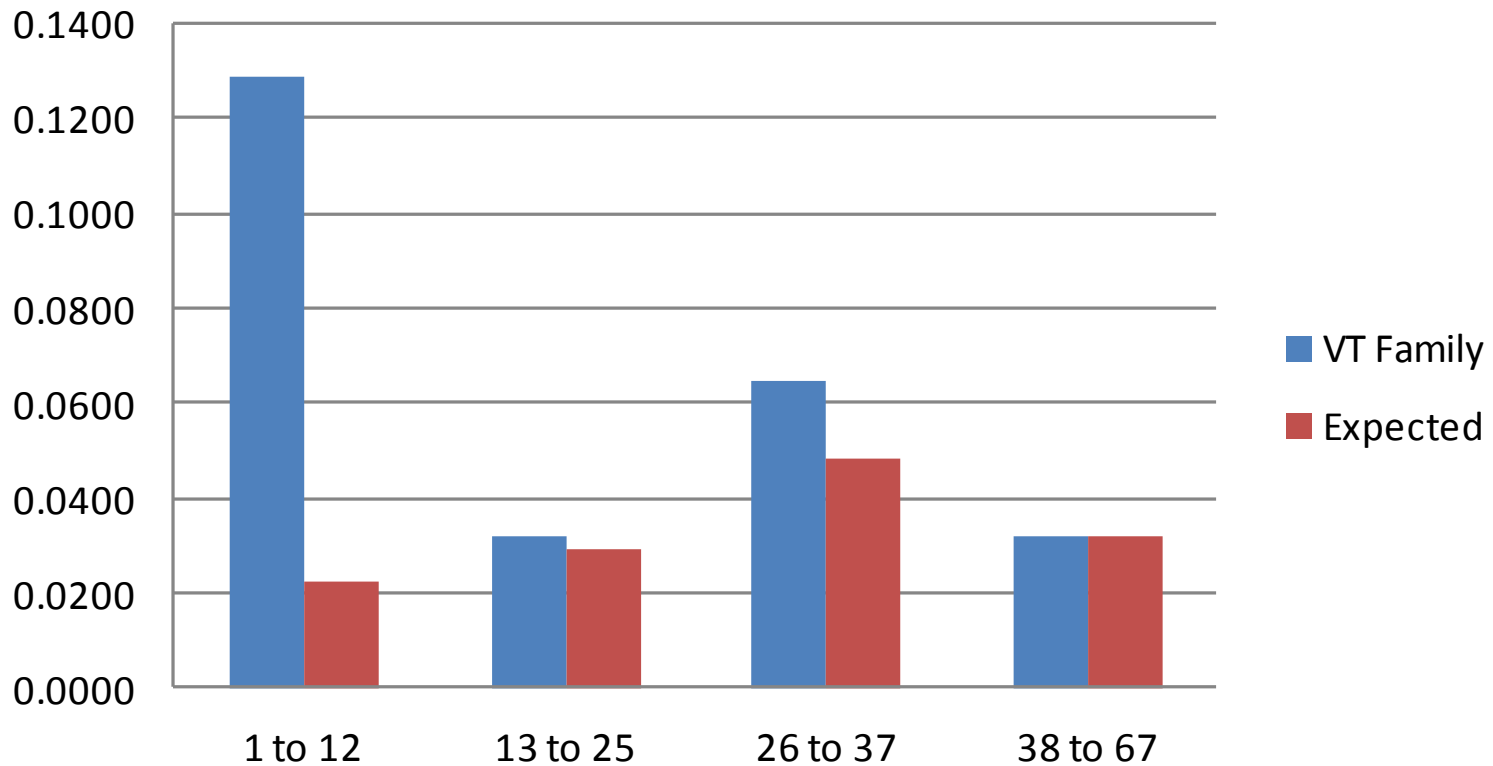
Name	DYS531	DYS578	DYF395S1	DYF395S2	DYS590	DYS537	DYS641	DYS472	DYF406S1	DYS511	DYS425	DYS413a	DYS413b	DYS557	DYS594
3VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
2VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
1VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10

53-67

	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Name	DYS436	DYS490	DYS534	DYS450	DYS444	DYS481	DYS520	DYS446	DYS617	DYS568	DYS487	DYS572	DYS640	DYS492	DYS565
3VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
2VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
1VT	12	12	17	8	12	23	20	13	12	11	13	11	11	12	12



Actual vs Expected Mutation Rate for Van Tuyl Family



	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16
VTM	12	23	14	11	11	14	12	12	11	13	13	17
OVT	12	24/23	14	11/10	11	14	12	12	11	13	13	16/17
AHT	13	24	14	11	11	14	12	12	12	13	13	16

Different from Ancestral Haplotype R1b1a2a1a1

Different from MRCA OVT

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS459	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17
VTM	17	9	10	11	11	25	15	20	28	14	15	17	17
OVT	17												
AHT	17												

	26
Name	DYS460
3VT	11
2VT	11
1VT	11
VTM	11
OVT	11
AHT	11

	27
Name	DYS531
3VT	11
2VT	11
1VT	11
VTM	11
OVT	11
AHT	11

	53
Name	DYS436
3VT	12
2VT	12
1VT	12
VTM	12
OVT	12
AHT	12

	54
Name	DYS436
3VT	12
2VT	12
1VT	12
VTM	12
OVT	12
AHT	12

	59
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10
AHT	10

	60
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10
AHT	10

	61
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10
AHT	10

	62
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10
AHT	10

	63
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10
AHT	10

	64
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10
AHT	10

	65
Name	DYS594
3VT	10
2VT	10
1VT	10
VTM	10
OVT	10

Different from MRCA OVT

DYS594	10
	10
	10
	10
	10
	10

Results with Recent Mutations Highlighted

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS391	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16
VTM	12	23	14	11	11	14	12	12	11	13	13	17
OVT	12	24/23	14	11/10	11	14	12	12	11	13	13	16/17
AHT	13	24	14	11	11	14	12	12	12	13	13	16

13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17
VTM	17	9	10	11	11	25	15	20	28	14	15	17	17
OVT	17	9	10	11	11	25	15	20	29/28	14	15	17	17
AHT	17	9	10	11	11	25	15	19	29	15	15	17	17

Different from Ancestral
Haplotype R1b1a2a1a1

Different from MRCA OVT

26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
3VT	11	11	19	23	15	15	19	18	38	38	12	13
2VT	11	11	19	23	15	15	18	18	38	39	12	13
1VT	11	11	19	23	15	15	18	18	38	38	12	13
VTM	11	11	19	23	15	15	18	18	38	38	12	13
OVT	11	11	19	23	15	15	18	18	38	38	12	13
AHT	11	11	19	23	15	15	18	17	37	37	12	12

38-52

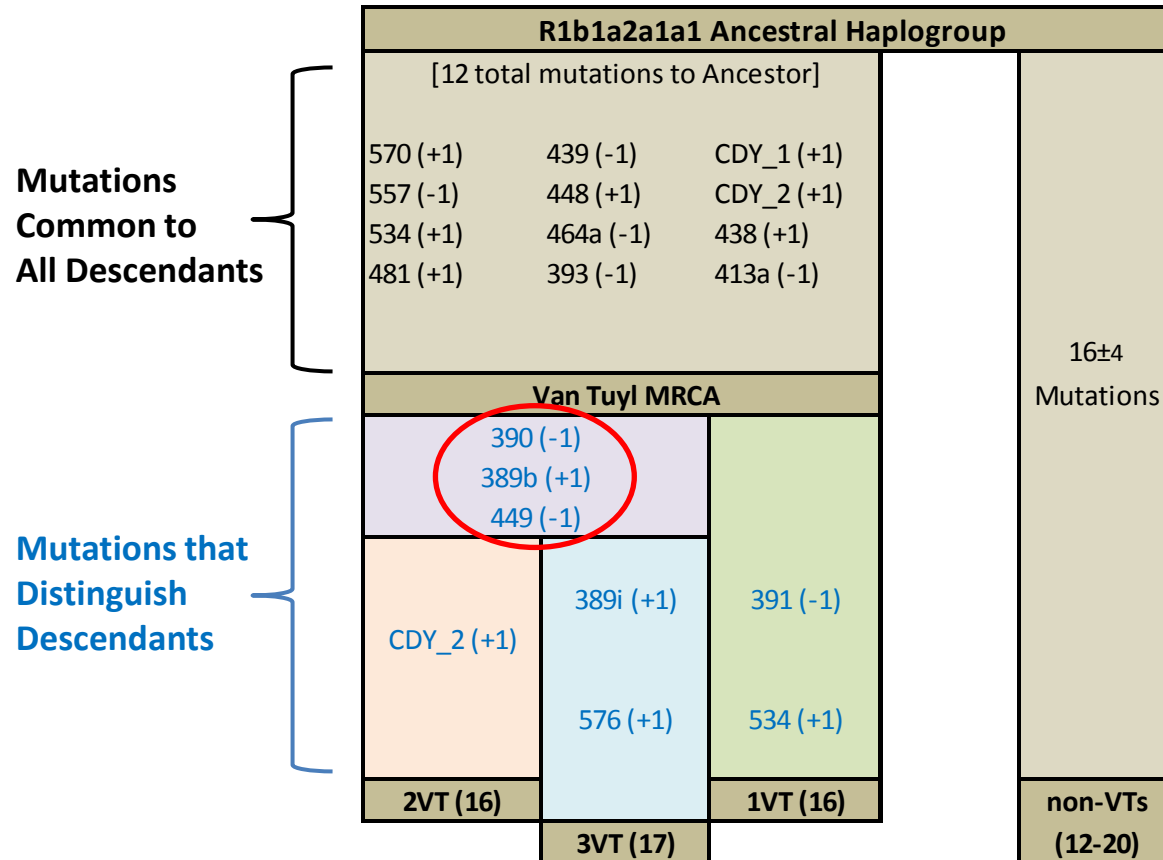
Name	DYS531	DYS578	DYF395S1	DYF395S2	DYS590	DYS537	DYS641	DYS472	DYF406S1	DYS511	DYS425	DYS413a	DYS413b	DYS557	DYS594
3VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
2VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
1VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
VTM	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
OVT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
AHT	11	9	15	16	8	10	10	8	10	10	12	23	23	16	10

53-67

	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Name	DYS436	DYS490	DYS534	DYS450	DYS444	DYS481	DYS520	DYS446	DYS617	DYS568	DYS487	DYS572	DYS640	DYS492	DYS565
3VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
2VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
1VT	12	12	17	8	12	23	20	13	12	11	13	11	11	12	12
VTM	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
OVT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
AHT	12	12	15	8	12	22	20	13	12	11	13	11	11	12	12

Phylogeny Generation: Step 1

From Raw Data, Segregate and Organize Mutations

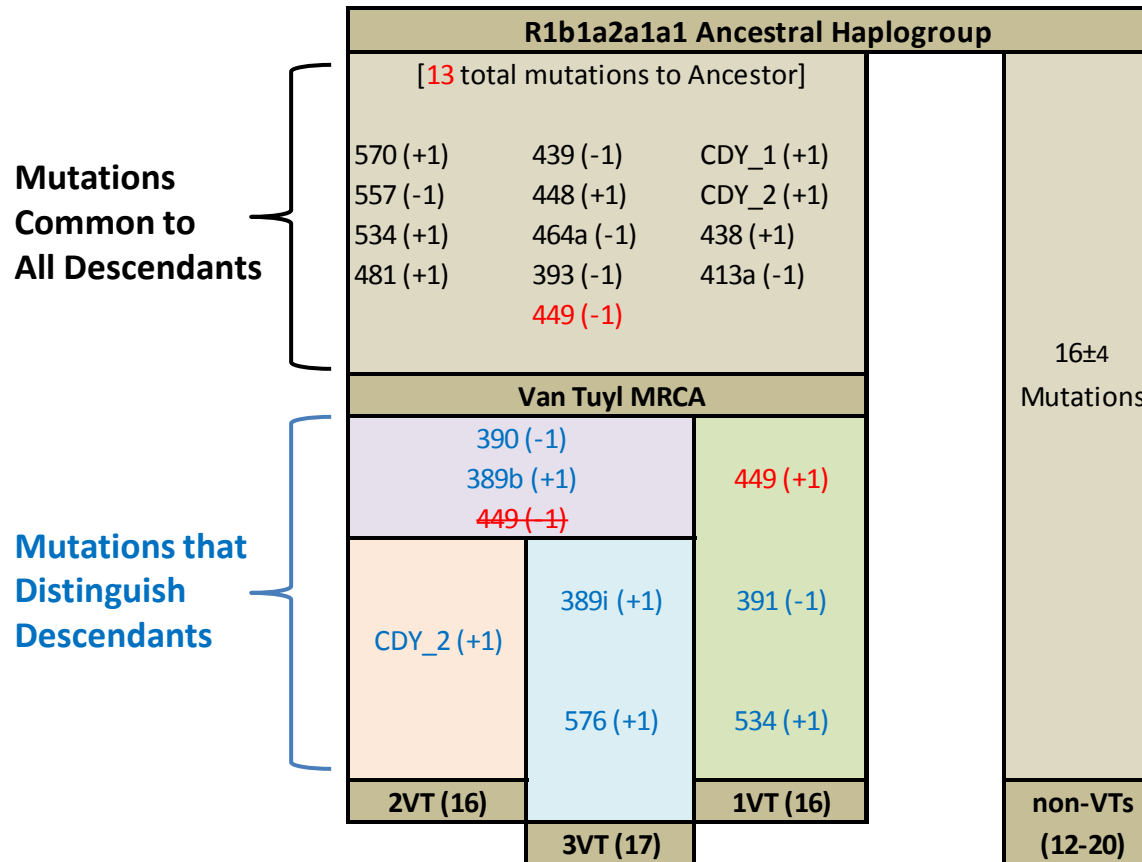


Note: 67 Loci

Problem: Mutations After MRCA are Unbalanced (4, 5, 2)

Phylogeny Generation: Step 2

Re-Partition Mutations to Balance Branches



**Mutations in 449
Reassigned:
(-1) moved pre-MRCA;
Offsetting (+1) Post-MRCA**

Why 449?
Analysis shows this scenario
Is the most likely of the three
Possibilities

This scenario is 19x more likely
than the one in which
390, 389b and 449 all mutate
In the CDVT/RLVT line

Note: 67 Loci

Now Mutations After MRCA are Balanced (3, 4, 3)

Final Results with MRCAs and Ancestral Haplotype

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16
VTM	12	23	14	11	11	14	12	12	11	13	13	17
OVT	12	24	14	11	11	14	12	12	11	13	13	16
AHT	13	24	14	11	11	14	12	12	12	13	13	16

Different from Ancestral Haplotype R1b1a2a1a1

Different from MRCA OVT

13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17
VTM	17	9	10	11	11	25	15	20	28	14	15	17	17
OVT	17	9	10	11	11	25	15	20	28	14	15	17	17
AHT	17	9	10	11	11	25	15	19	29	15	15	17	17

26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
3VT	11	11	19	23	15	15	19	18	38	38	12	13
2VT	11	11	19	23	15	15	18	18	38	39	12	13
1VT	11	11	19	23	15	15	18	18	38	38	12	13
VTM	11	11	19	23	15	15	18	18	38	38	12	13
OVT	11	11	19	23	15	15	18	18	38	38	12	13
AHT	11	11	19	23	15	15	18	17	37	37	12	12

38-52

Name	DYS531	DYS578	DYF395S1	DYF395S2	DYS590	DYS537	DYS641	DYS472	DYF406S1	DYS511	DYS425	DYS413a	DYS413b	DYS557	DYS594
3VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
2VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
1VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
VTM	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
OVT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
AHT	11	9	15	16	8	10	10	8	10	10	12	23	23	16	10

53-67

	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Name	DYS436	DYS490	DYS534	DYS450	DYS444	DYS481	DYS520	DYS446	DYS617	DYS568	DYS487	DYS572	DYS640	DYS492	DYS565
3VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
2VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
1VT	12	12	17	8	12	23	20	13	12	11	13	11	11	12	12
VTM	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
OVT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
AHT	12	12	15	8	12	22	20	13	12	11	13	11	11	12	12

Phylogeny Generation: Step 3

Add Post-MRCA Timeline Based on Known Genealogy

Estimate pre-MRCA Time Using Independently Derived Mutation Rates

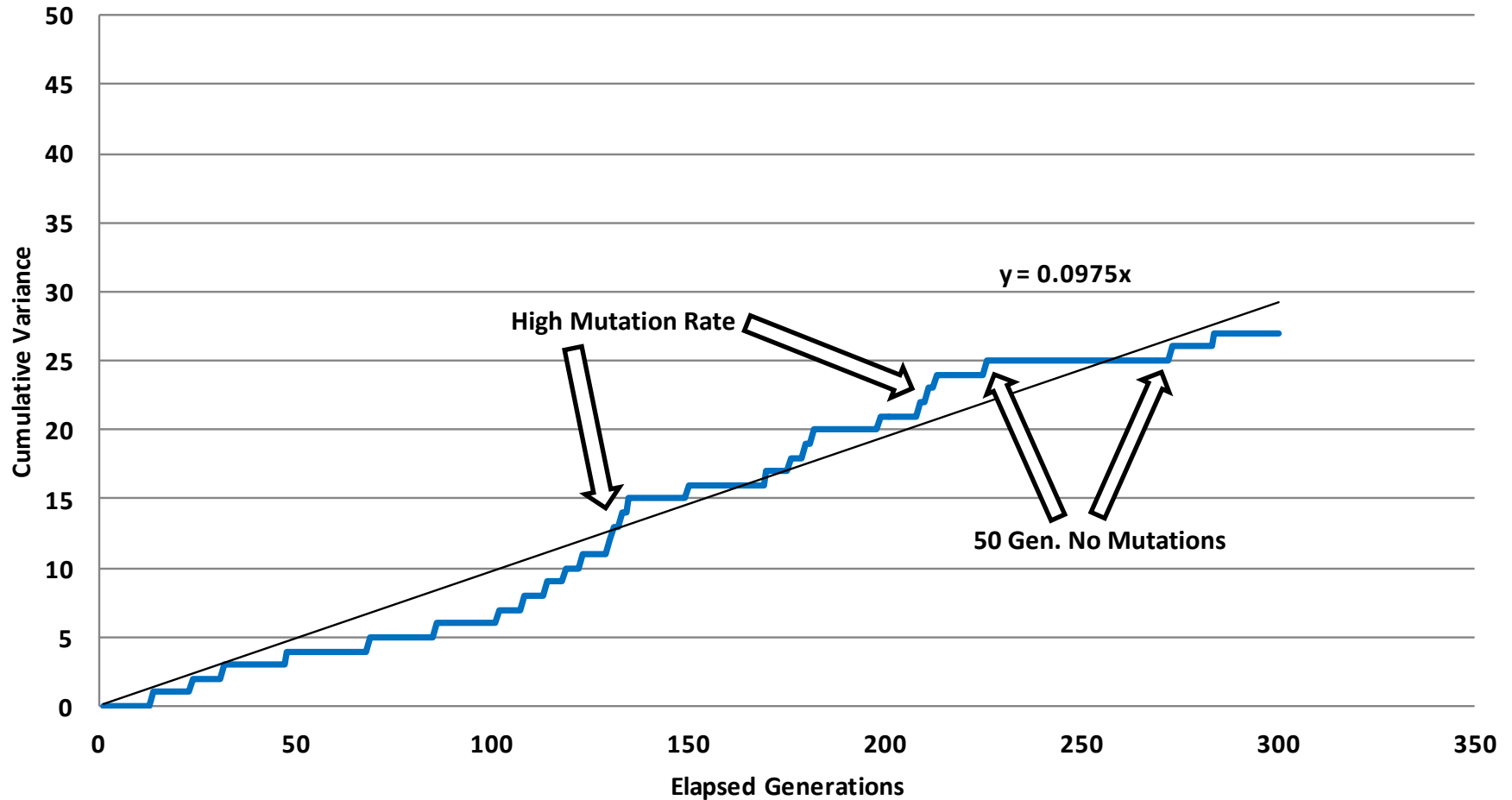
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-120	[13 total mutations to Ancestor]		
.			
.	570 (+1)	439 (-1)	CDY_1 (+1)
.	557 (-1)	448 (+1)	CDY_2 (+1)
.	534 (+1)	464a (-1)	438 (+1)
.	481 (+1)	393 (-1)	413a (-1)
.		449 (-1)	
.			
0	Van Tuyl MRCA [OVT]		
.	390 (-1)		16±4 Mutations
.	389b (+1)		
.			
.			
4	CDY_2 (+1)	389i (+1)	391 (-1)
.			
.		576 (+1)	534 (+1)
.			
10	2VT (16)		1VT (16)
11		3VT (17)	
			non-VTs (12-20)

Note: 67 Loci

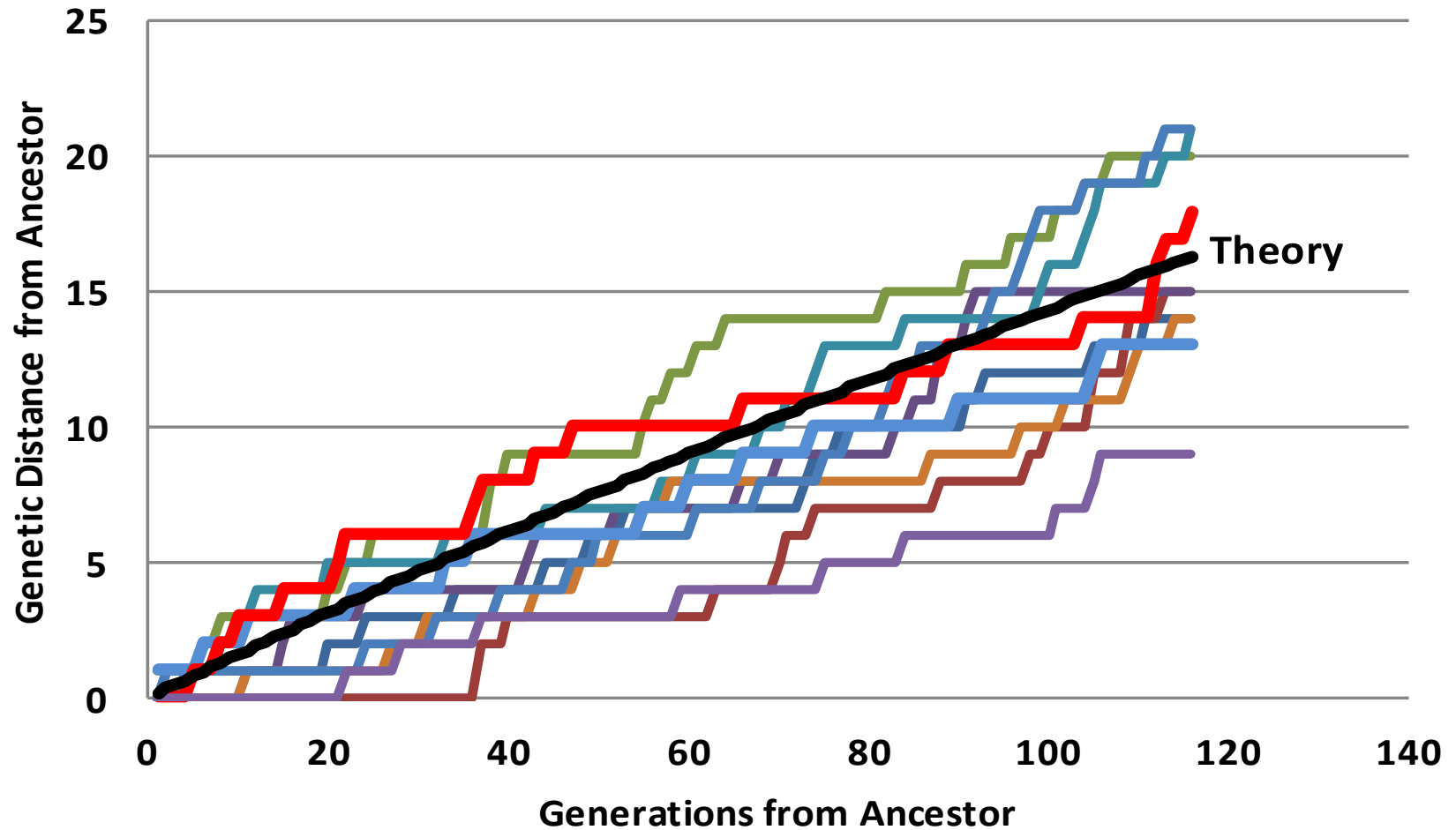
Note that the number of Van Tuyl mutations in ~130 generations is completely consistent with average mutations observed in R1b1a2a1a1 data . But the number of mutations since MRCA is much higher than would be expected.

Random Walk Monte Carlo Simulation

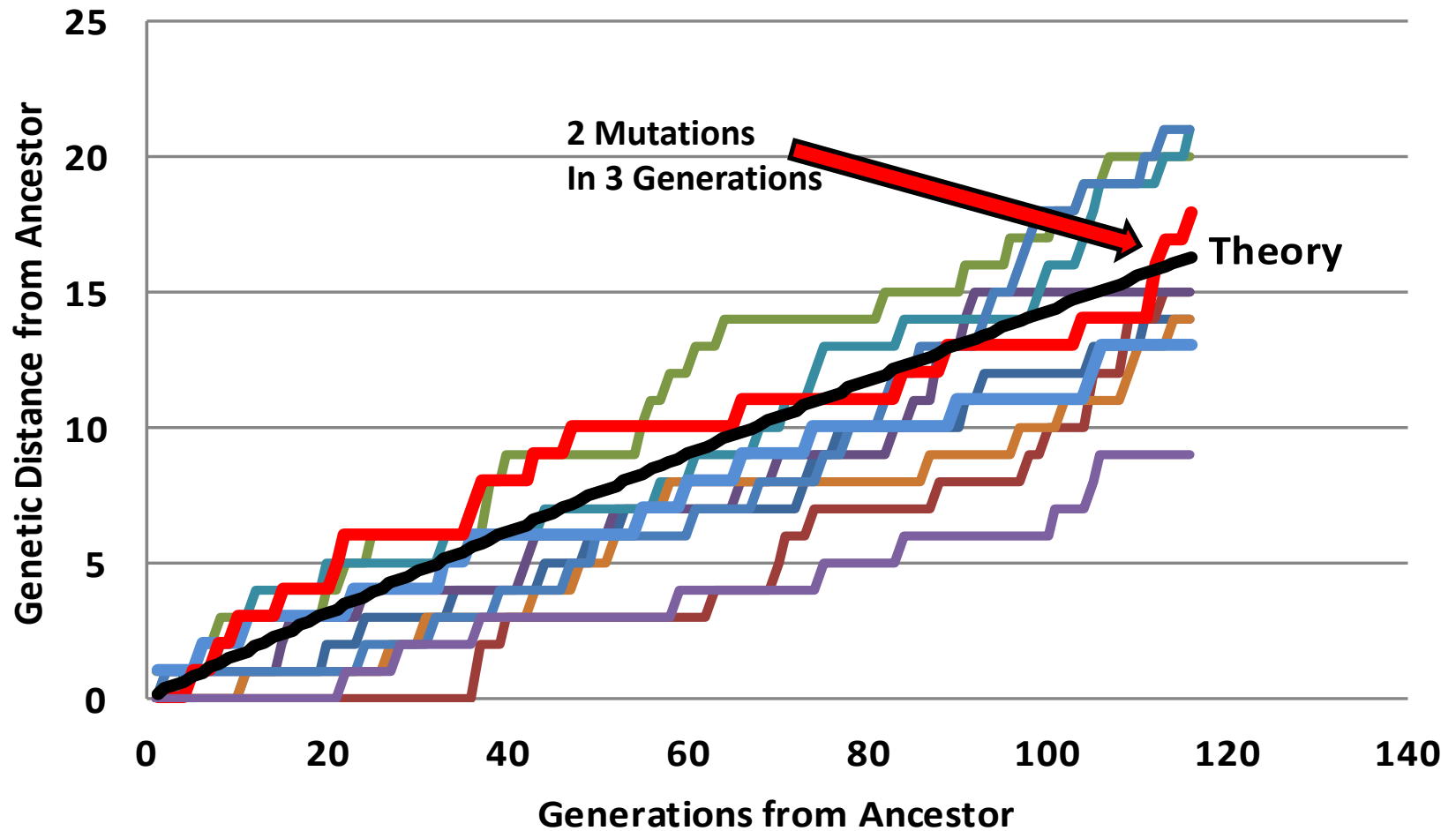
Cumulative Variance vs Elapsed Generations



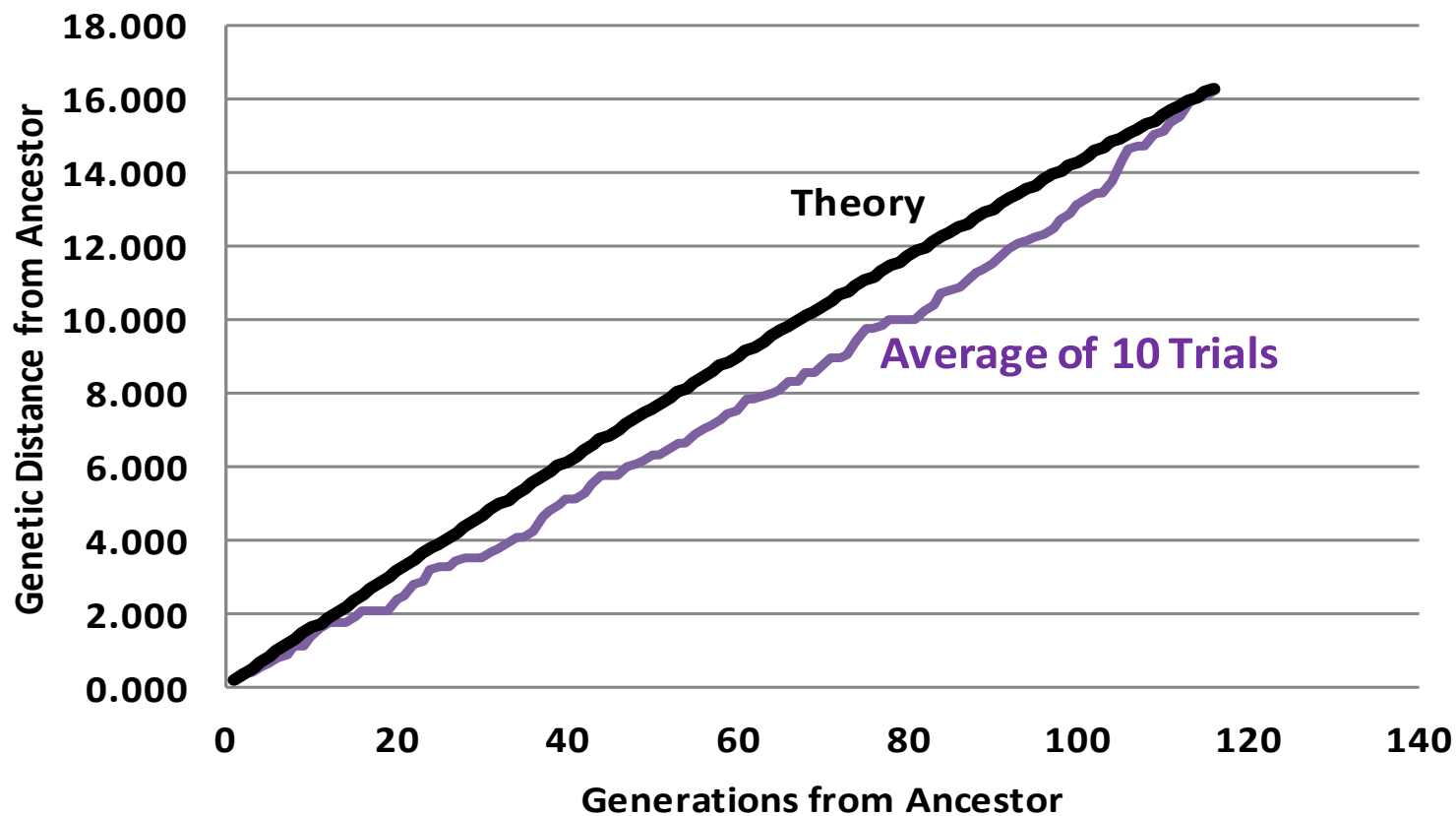
Monte Carlo Simulation of Y-STR Mutation



Monte Carlo Simulation of Y-STR Mutation



Monte Carlo Simulation of Y-STR Mutation



**Mutations Occur Sporadically, Not at a Constant Rate
But When Averaged Over Many Individual Evolutions,
an Average Mutation Rate Emerges**

$$\mu \times g = \text{Var} = N = \text{Total Mutations}$$

μ = Average Mutation Rate per Generation

g = Number of Generations Elapsed since MRCA

Var = Variance of Data Set with Common Ancestor

N = Total Number of *Actual* Mutations

Per Infinite Alleles Theory:

Observed Mutations $\leq$ Actual Number of Mutations since MRCA

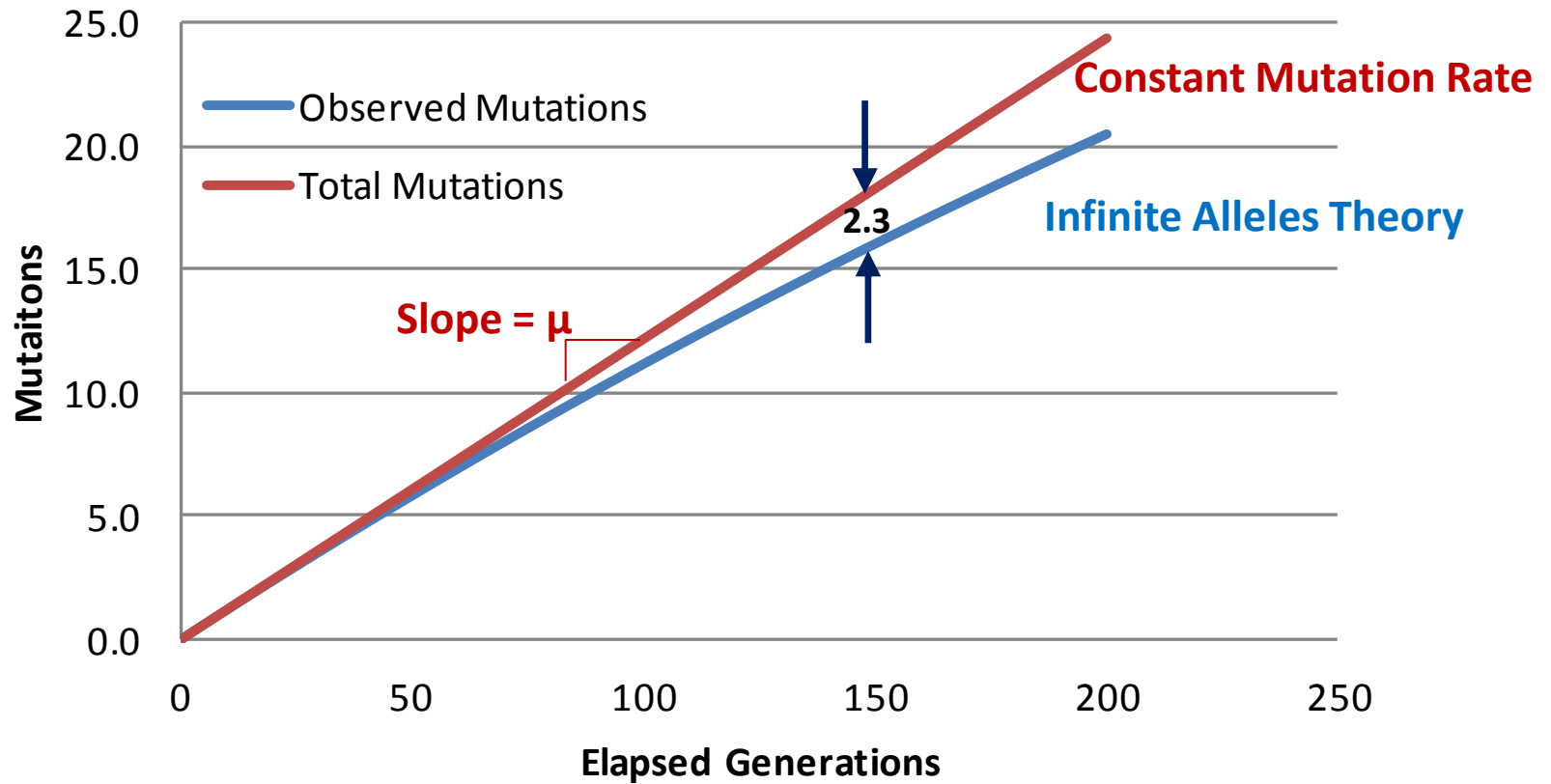
$$N_{\text{obs}} = [1 - \exp(-\mu \times g)]$$

N_{obs} = Number of *Observed* Mutations

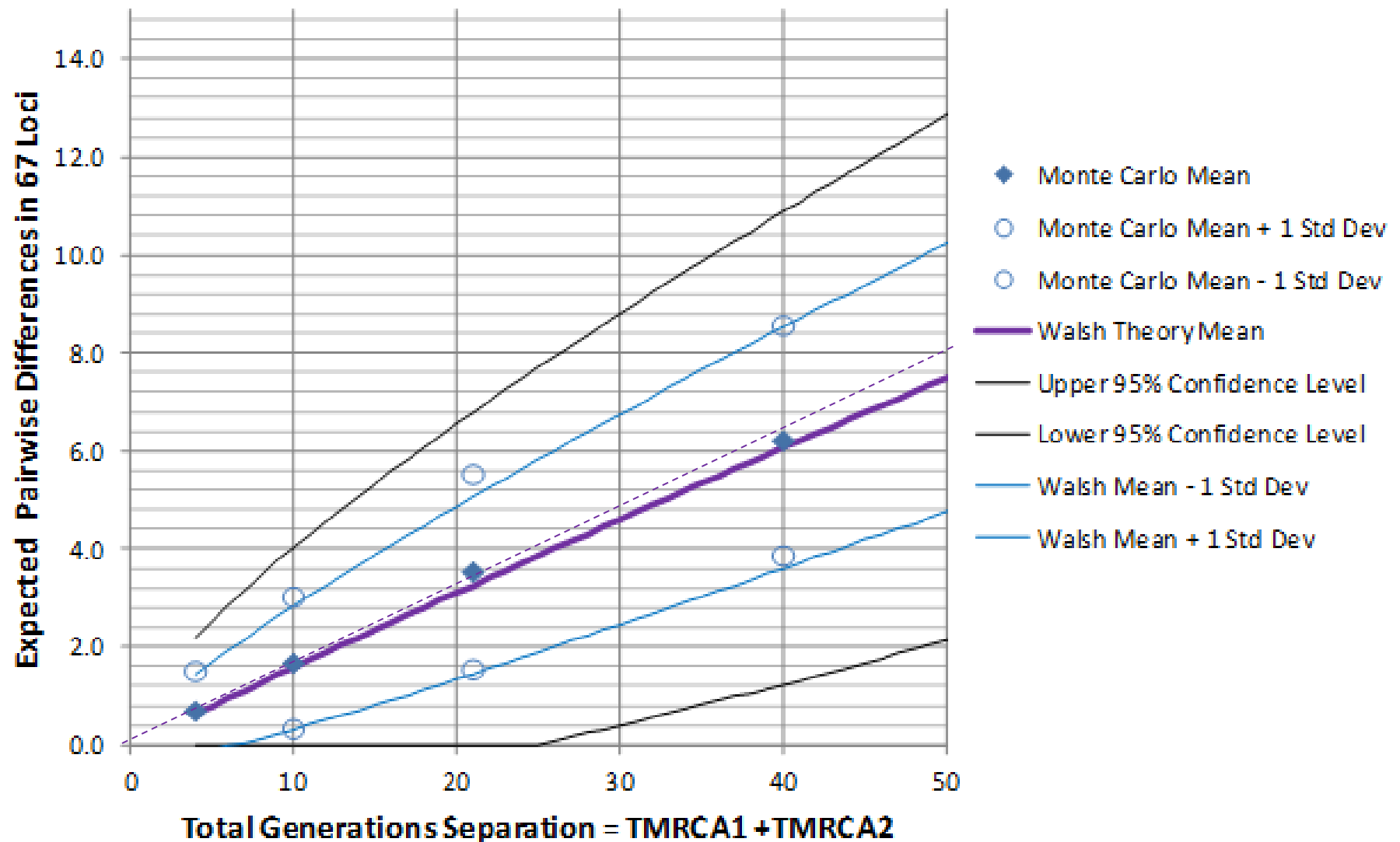
μ = Average Mutation Rate per Generation

g = Number of Generations Elapsed since MRCA

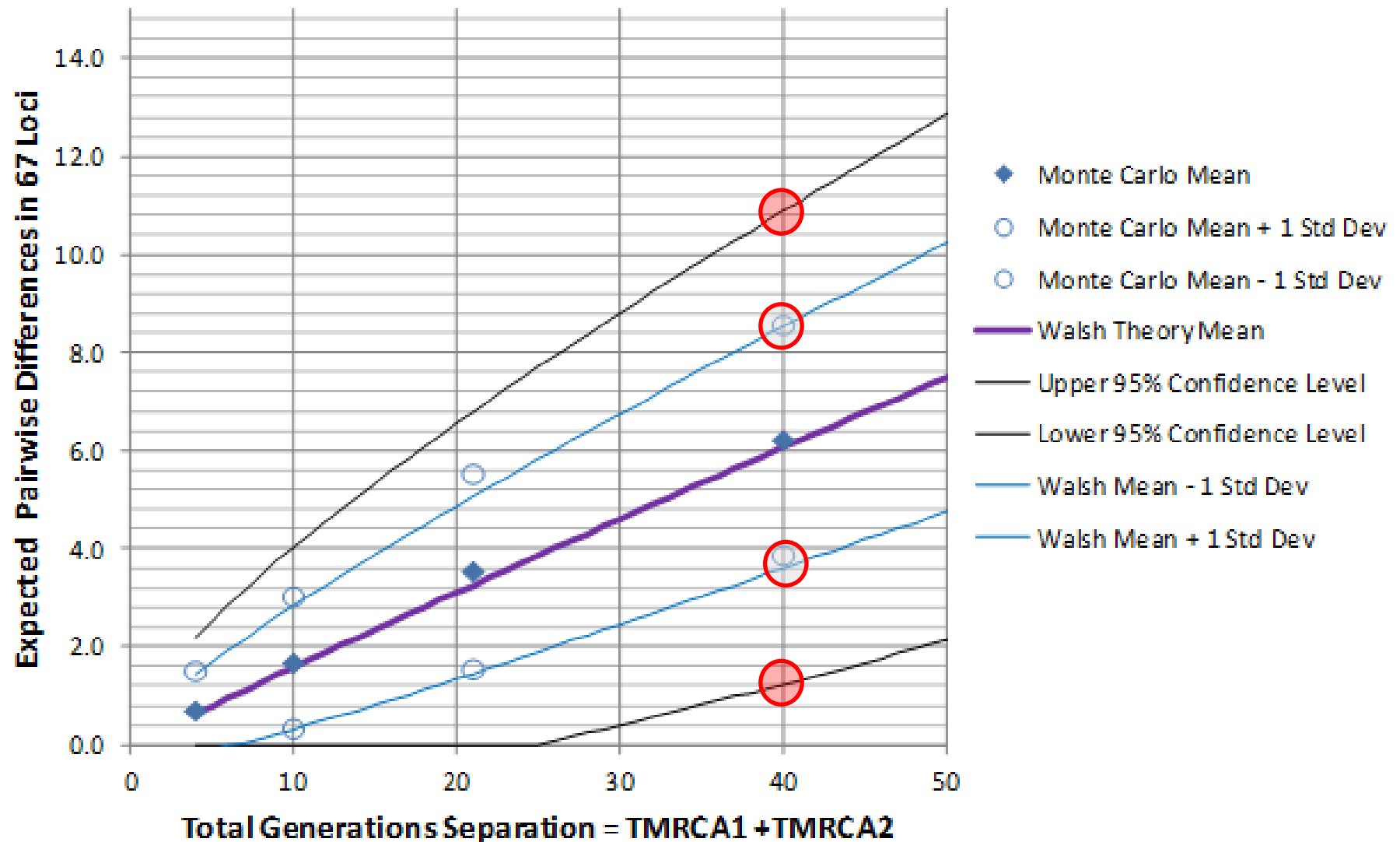
Total and Observed Mutations



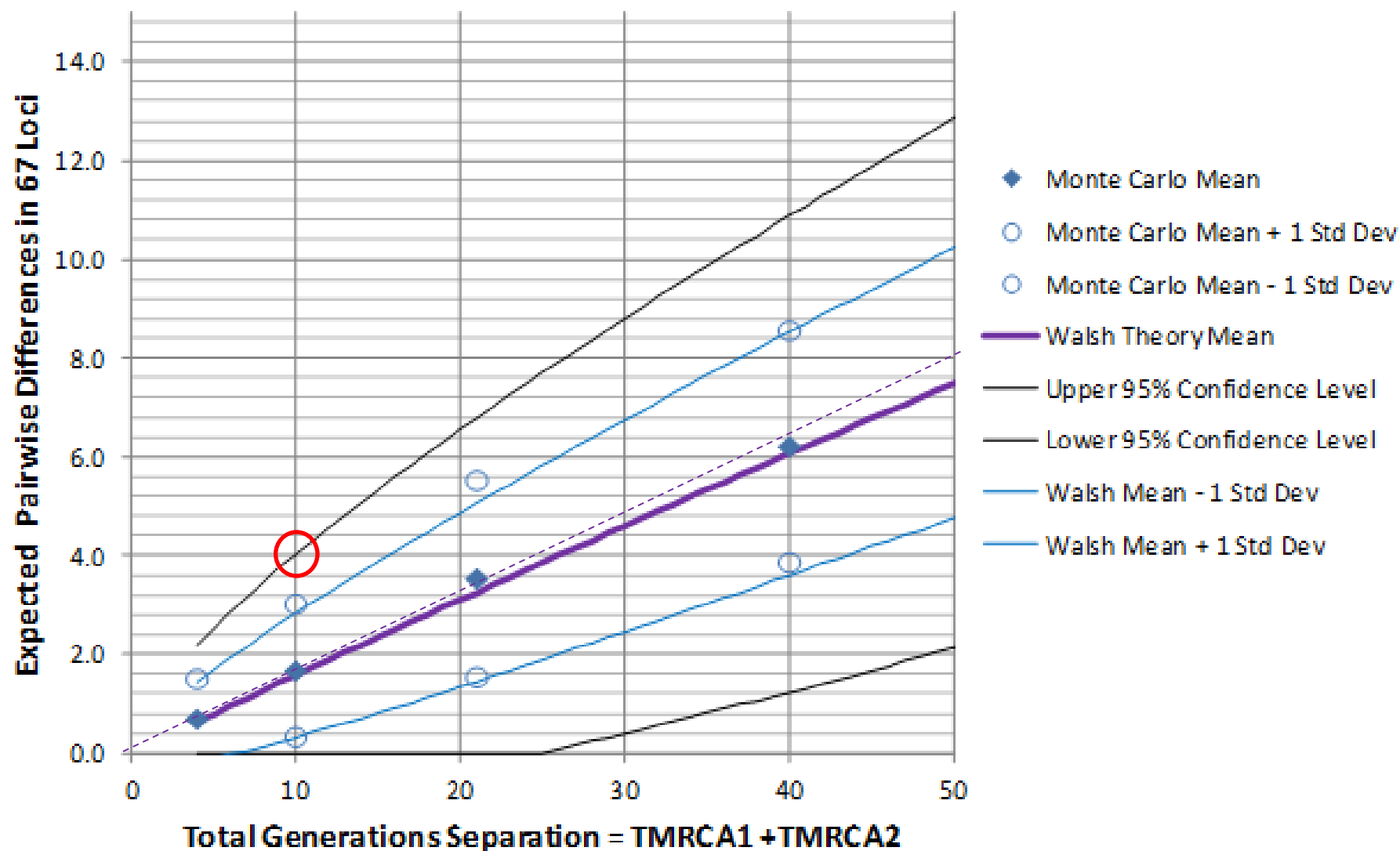
Expected Pairwise Differences in 67 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



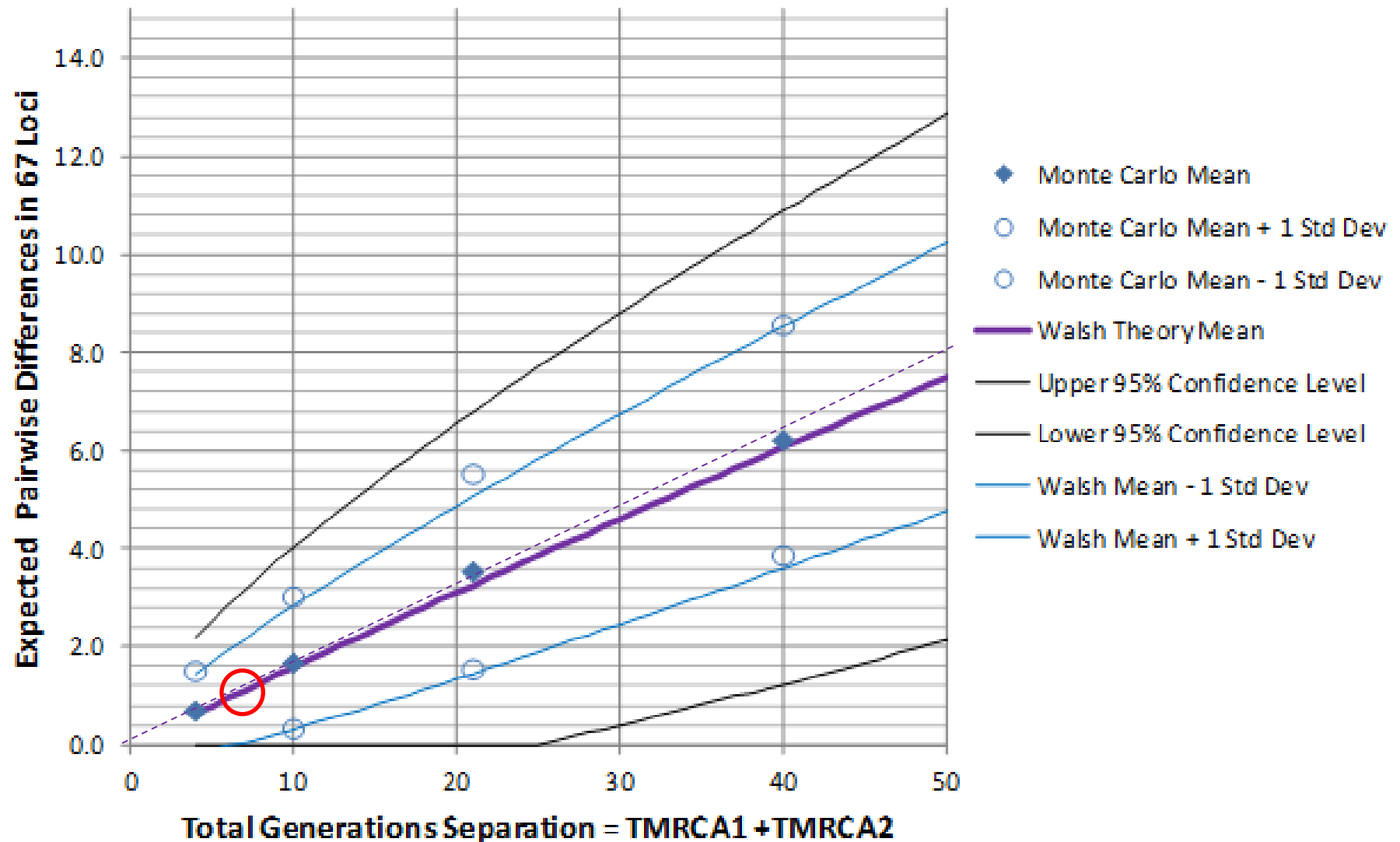
Expected Pairwise Differences in 67 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



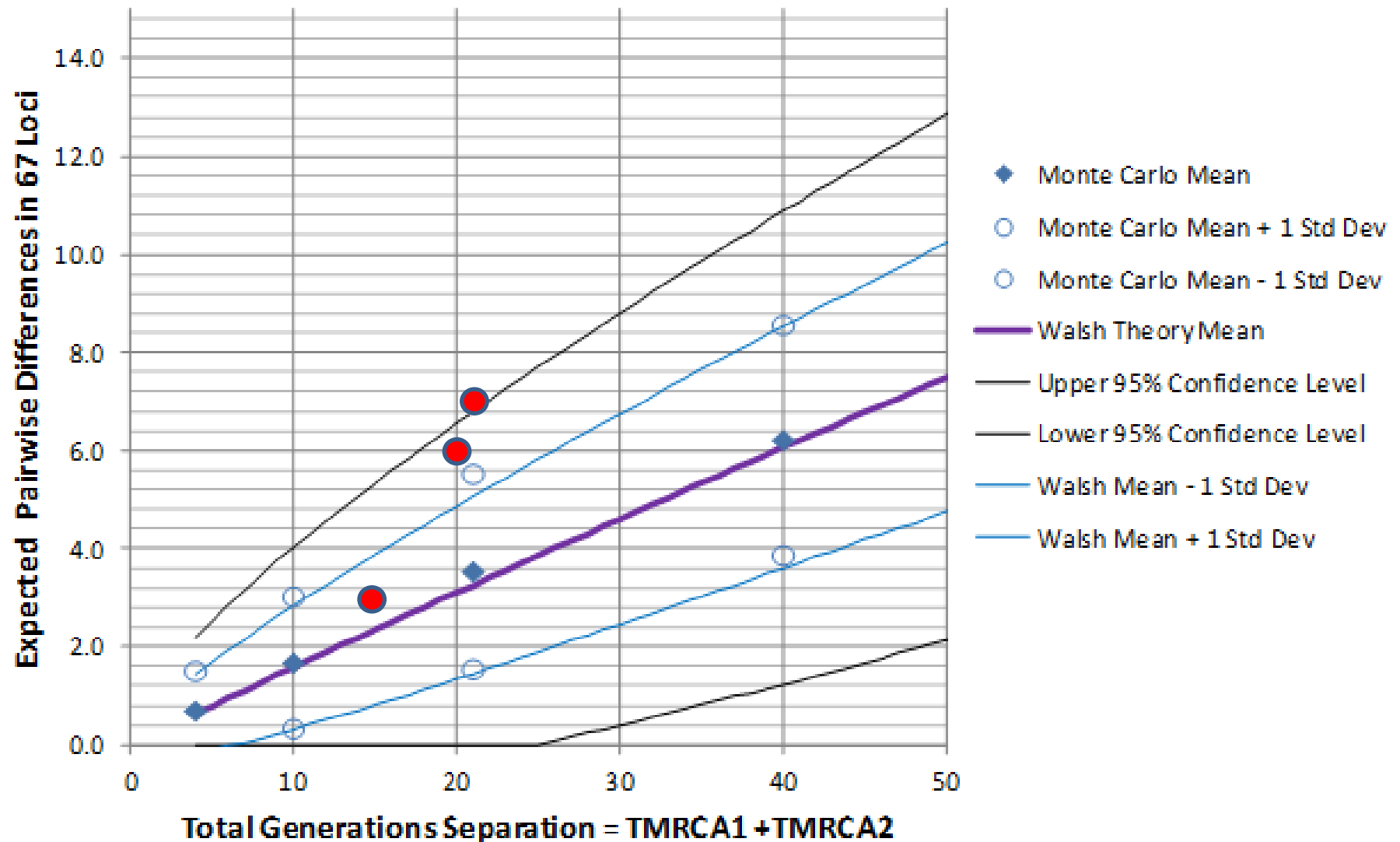
Expected Pairwise Differences in 67 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



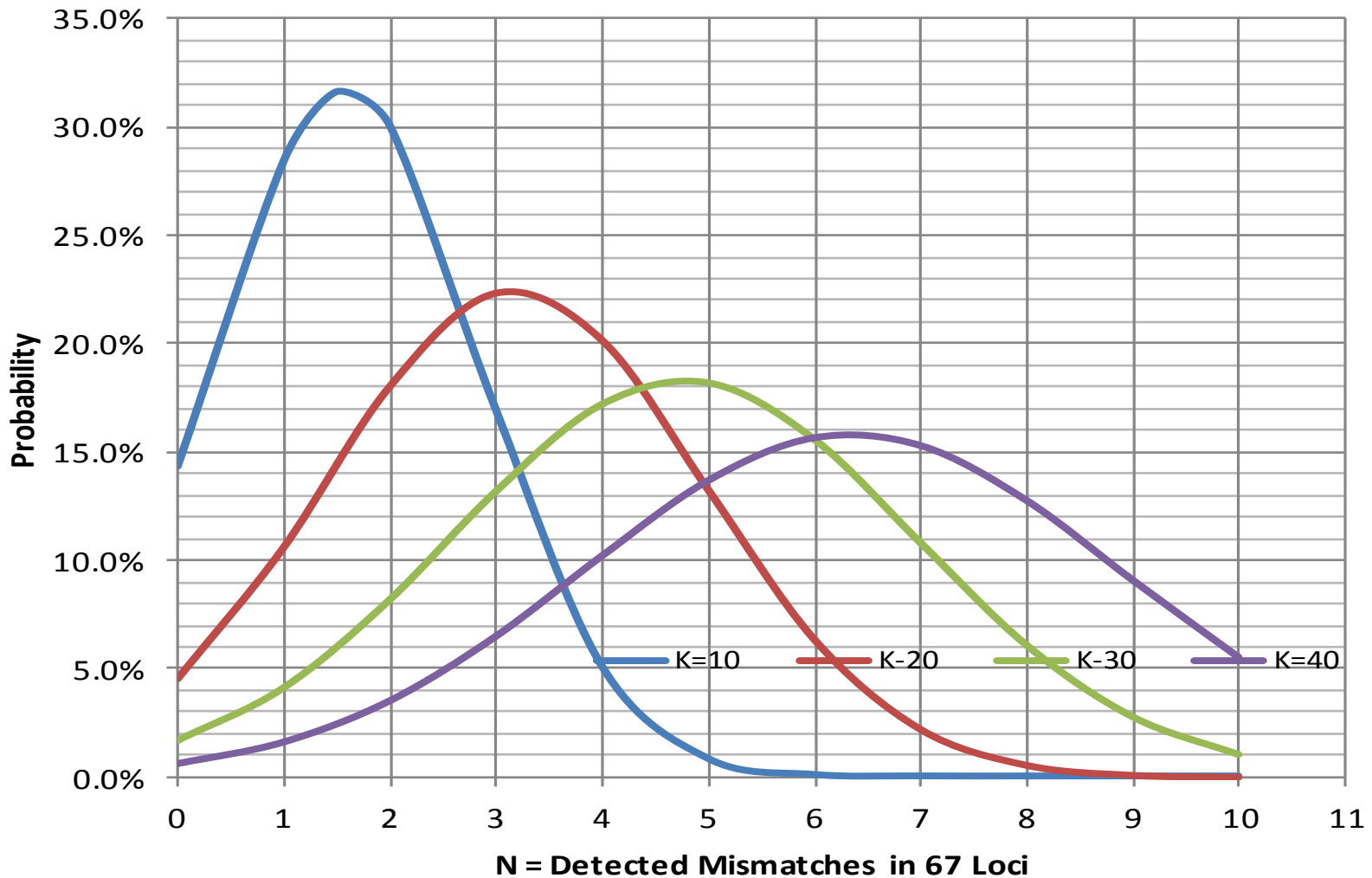
Expected Pairwise Differences in 67 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



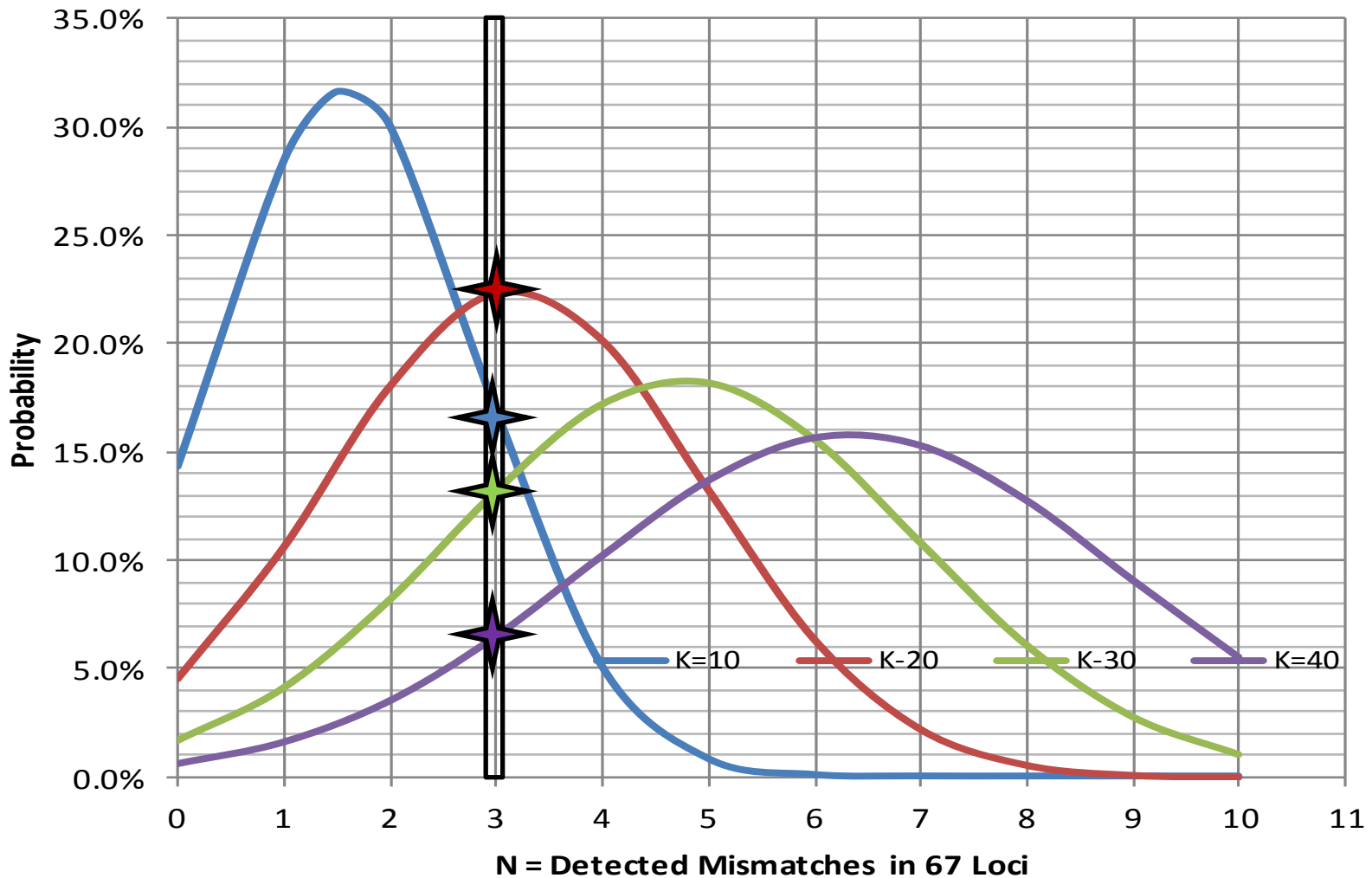
Expected Pairwise Differences in 67 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



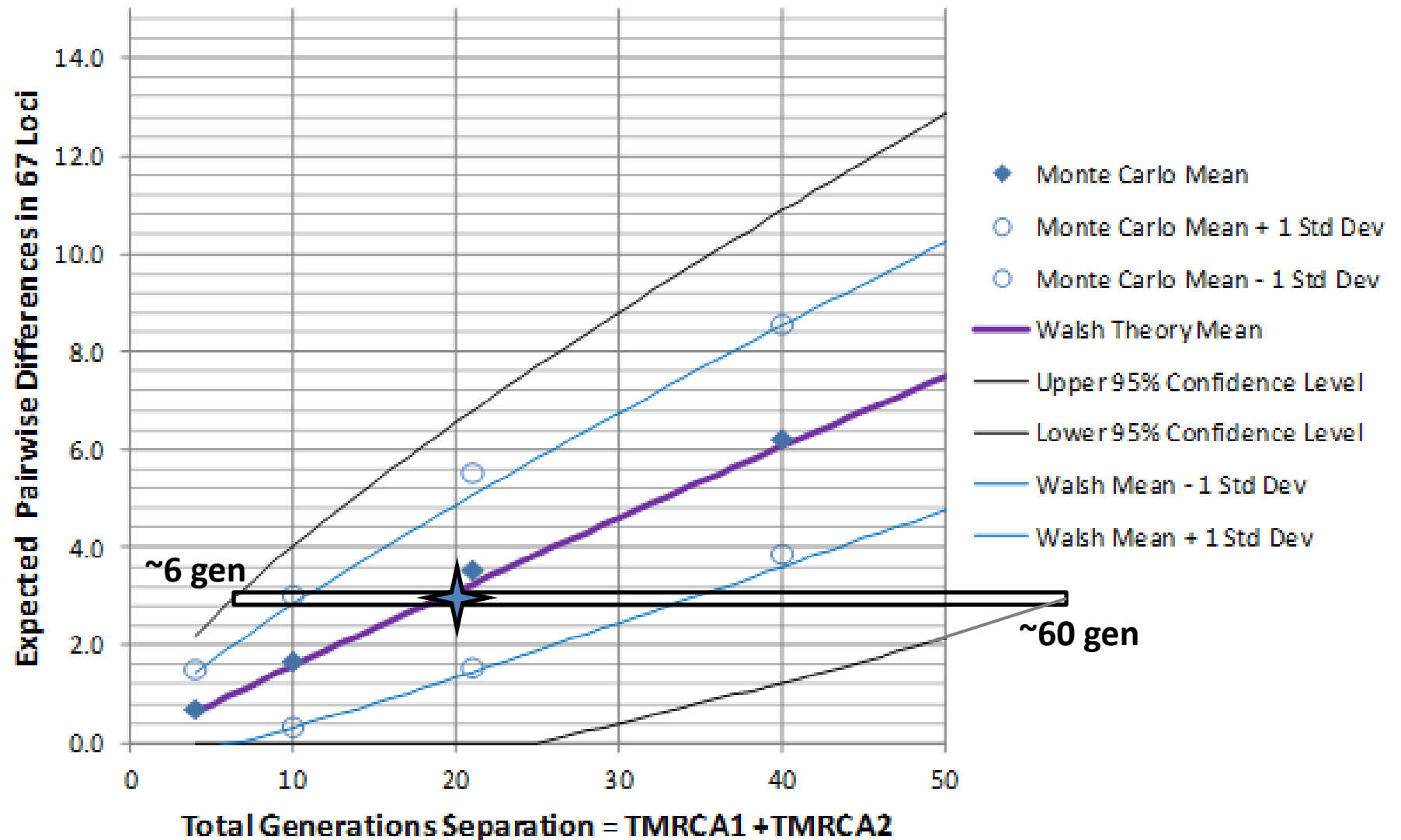
**Probability That Two People are
Separated by K Generations
-vs- Number of Observed Mismatches in 67 Loci**



**Probability That Two People are
Separated by K Generations
-vs- Number of Observed Mismatches in 67 Loci**



Expected Pairwise Differences in 67 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



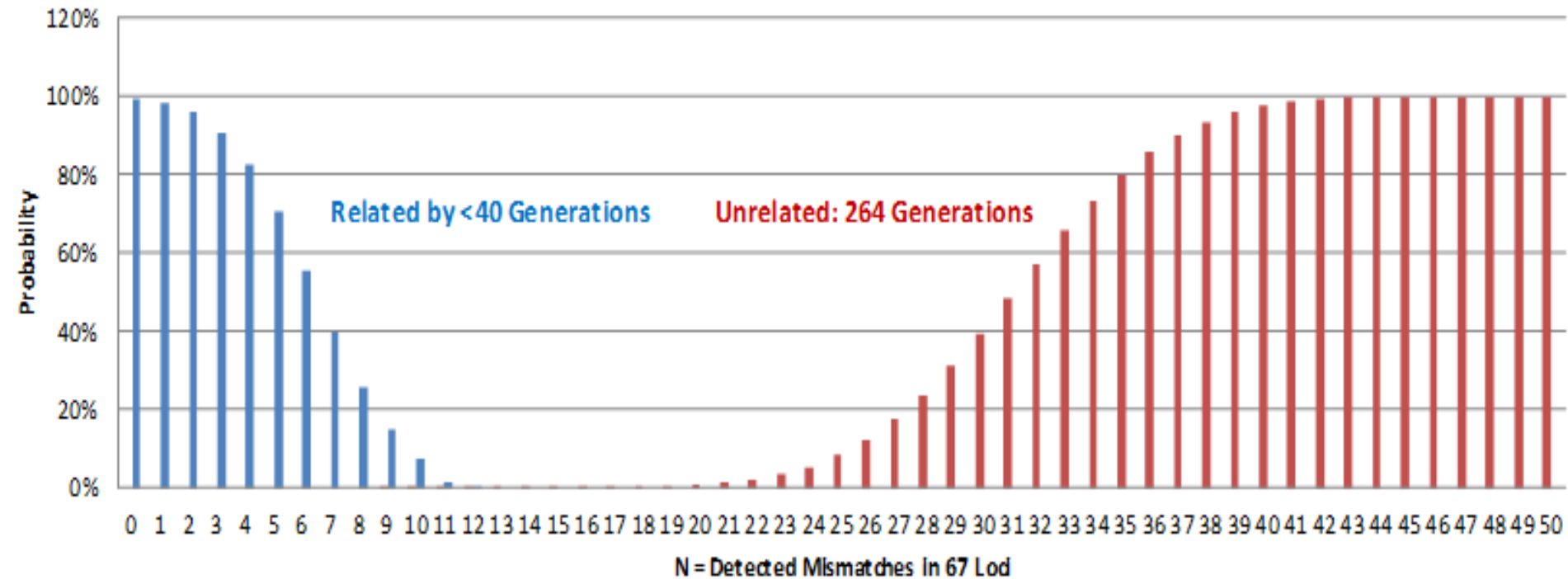
Conclusion:

Despite Instructions, Accurately Estimating Time to MRCA is Just Not Possible

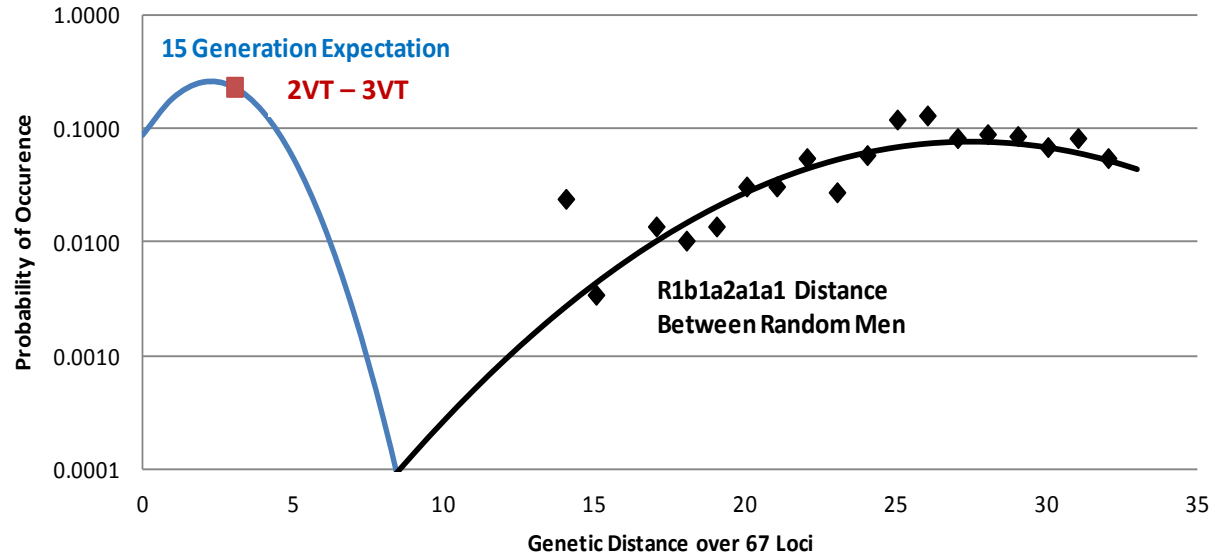
Your degree of matching is within the range of most well-established surname lineages in Western Europe. If you have tested with the Y-DNA12 or Y-DNA25 test, you should consider upgrading to additional STR markers. Doing so will improve your time to common ancestor calculations.

But Relationship can Clearly Be Differentiated from non-Relationship

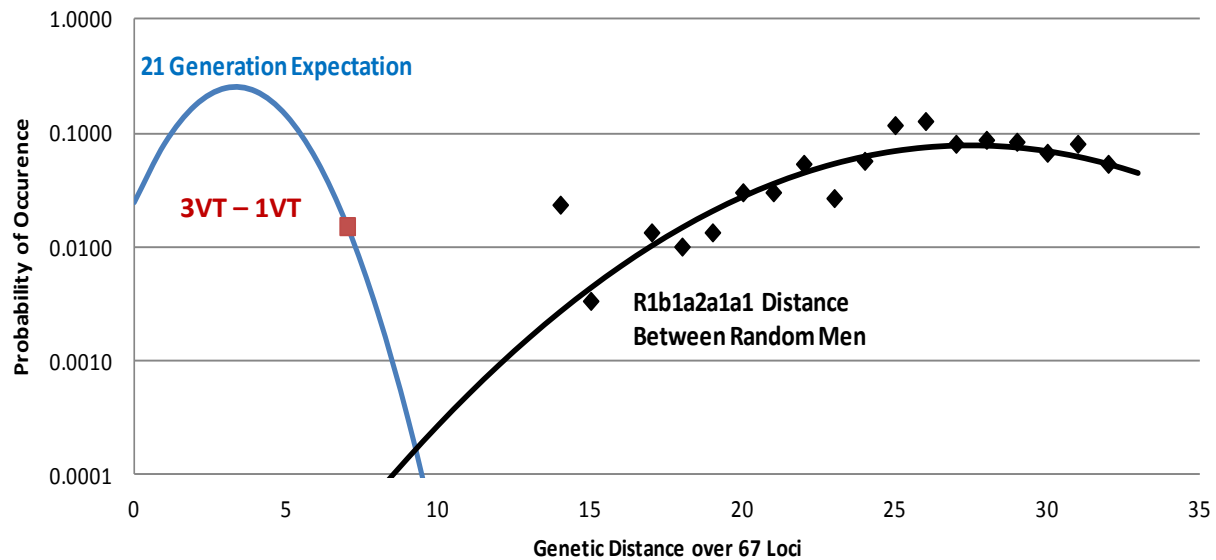
Cumulative Probability That Two People are Separated by <40 Generations and 264 Generations
-vs- Number of Observed Pairwise Differences in 67 Loci



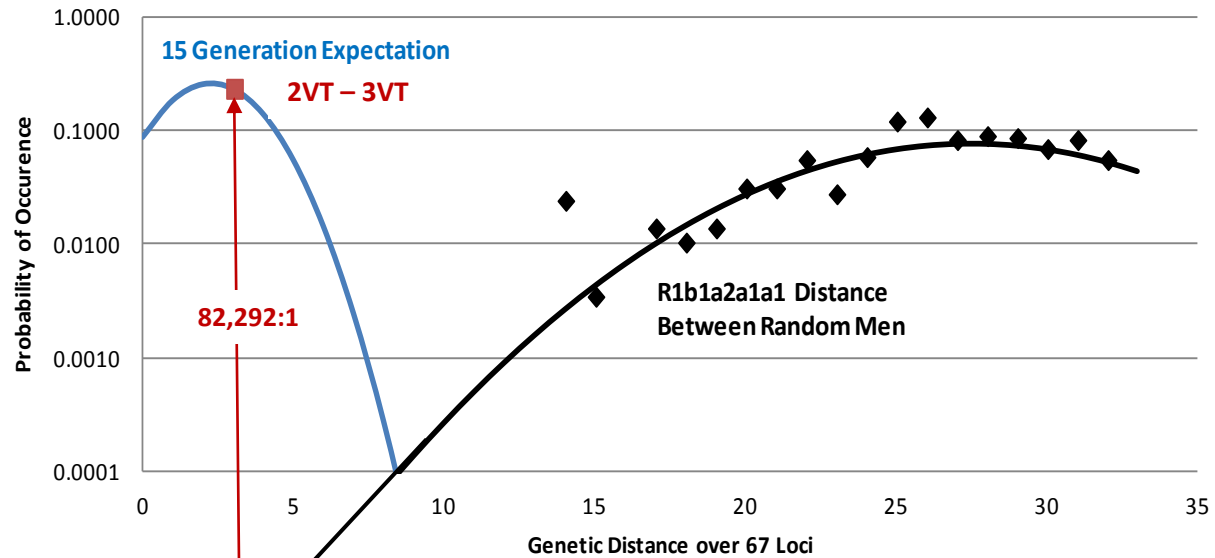
Probability-vs- Genetic Distance



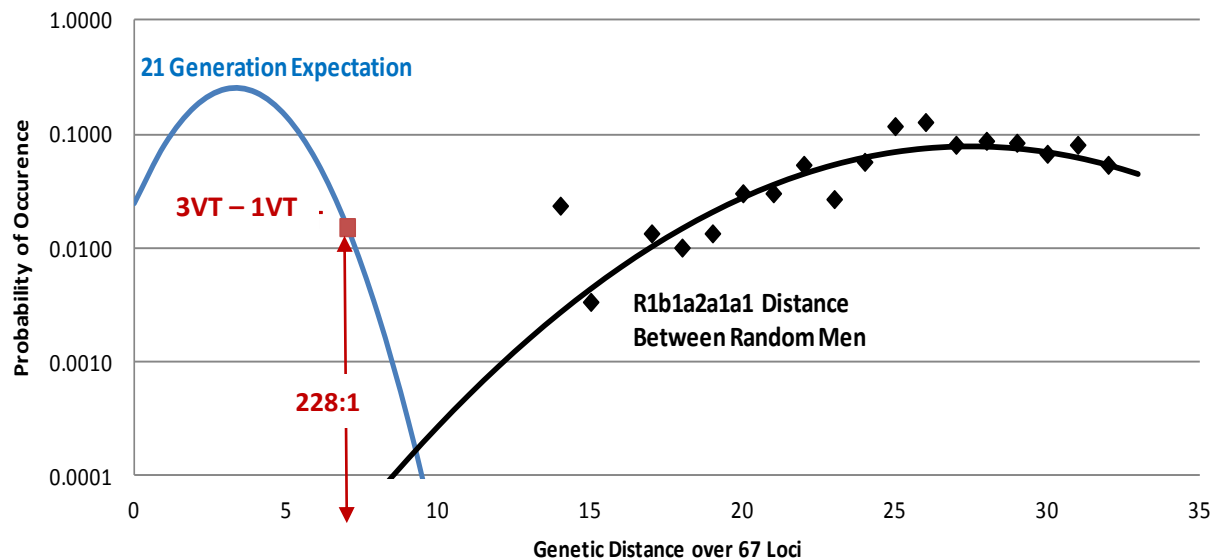
Probability-vs- Genetic Distance



Probability-vs- Genetic Distance



Probability-vs- Genetic Distance



Summary

- Relationship is Highly Likely
- Can we have More Certainty?
- What about changing direction to look for what we have in common, rather than what our differences are?

7 Loci in 37 Have Evolved from Ancestral Haplotype

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
3VT	12	23	14	11	11	14	12	12	11	14	13	17
2VT	12	23	14	11	11	14	12	12	11	13	13	17
1VT	12	24	14	10	11	14	12	12	11	13	13	16
VTM	12	23	14	11	11	14	12	12	11	13	13	17
OVT	12	24	14	11	11	14	12	12	11	13	13	16
AHT	13	24	14	11	11	14	12	12	12	13	13	16

Different from Ancestral Haplotype R1b1a2a1a1

Different from MRCA OVT

13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
3VT	17	9	10	11	11	25	15	20	28	14	15	17	17
2VT	17	9	10	11	11	25	15	20	28	14	15	17	17
1VT	17	9	10	11	11	25	15	20	29	14	15	17	17
VTM	17	9	10	11	11	25	15	20	28	14	15	17	17
OVT	17	9	10	11	11	25	15	20	28	14	15	17	17
AHT	17	9	10	11	11	25	15	19	29	15	15	17	17

26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS570	DYS570	CDY_1	CDY_2	DYS442	DYS438
3VT	11	11	19	23	15	15	19	18	38	38	12	13
2VT	11	11	19	23	15	15	18	18	38	39	12	13
1VT	11	11	19	23	15	15	18	18	38	38	12	13
VTM	11	11	19	23	15	15	18	18	38	38	12	13
OVT	11	11	19	23	15	15	18	18	38	38	12	13
AHT	11	11	19	23	15	15	18	18	37	37	12	12

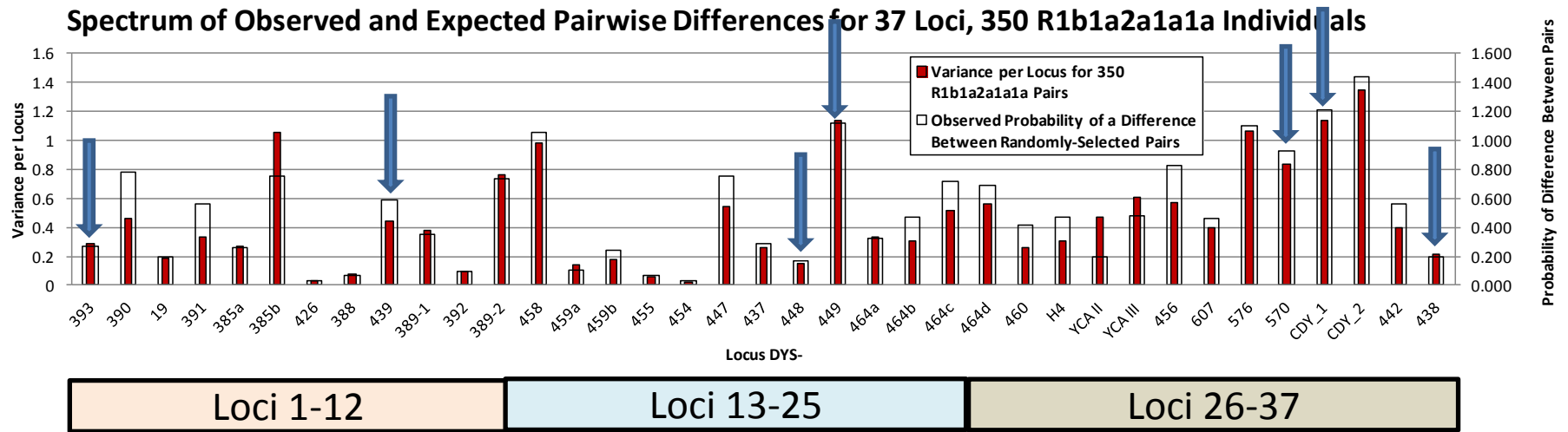
38-52

	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
Name	DYS531	DYS578	DYF395S1	DYF395S2	DYS590	DYS537	DYS641	DYS472	DYF406S1	DYS511	DYS425	DYS413a	DYS413b	DYS557	DYS594
3VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
2VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
1VT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
VTM	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
OVT	11	9	15	16	8	10	10	8	10	10	12	22	23	15	10
AHT	11	9	15	16	8	10	10	8	10	10	12	23	23	16	10

53-67

	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
Name	DYS436	DYS490	DYS534	DYS450	DYS444	DYS481	DYS520	DYS446	DYS617	DYS568	DYS487	DYS572	DYS640	DYS492	DYS565
3VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
2VT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
1VT	12	12	17	8	12	23	20	13	12	11	13	11	11	12	12
VTM	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
OVT	12	12	16	8	12	23	20	13	12	11	13	11	11	12	12
AHT	12	12	15	8	12	22	20	13	12	11	13	11	11	12	12

Seven Loci in Proposed Van Tuyl Haplotype

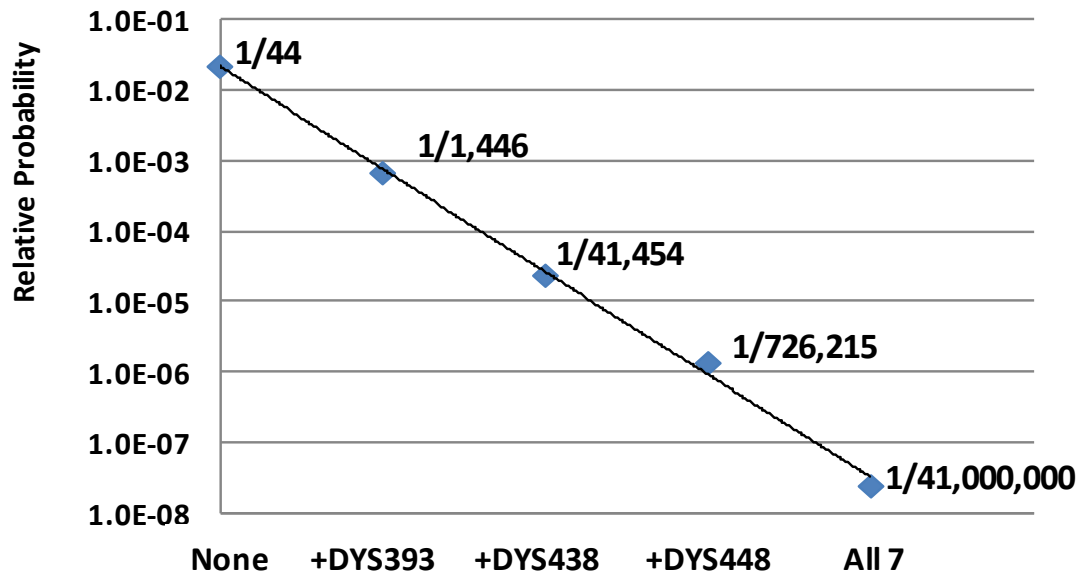


Van Tuyl Haplotype Has High Selectivity and Stability

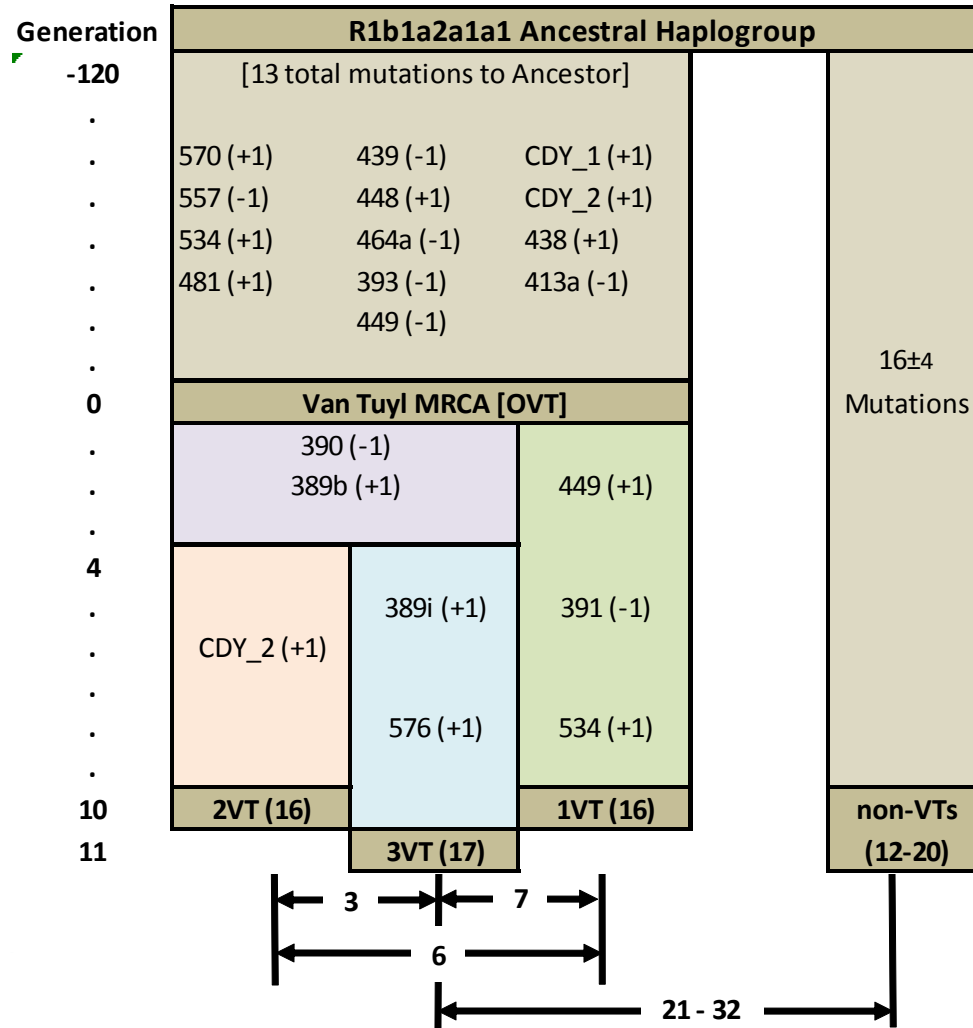
Locus	R1b1a2a1a1 Haplotype		Van Tuyl Haplotype	Selection Ratio	Avg. Gen to Mutation
HT Mode				44	
DYS-393	13	>>>>>>>	12	33	455
DYS-438	12	>>>>>>>	13	29	625
DYS-448	19	>>>>>>>	20	18	862
DYS-449	29	>>>>>>>	28	2	116
DYS-570	17	>>>>>>>	18	3	158
DYS-439	12	>>>>>>>	11	2	299
CDYa	37	>>>>>>>	38	2	116

116 – 862
Generations
Between
Mutations

Van Tuyl Haplotype



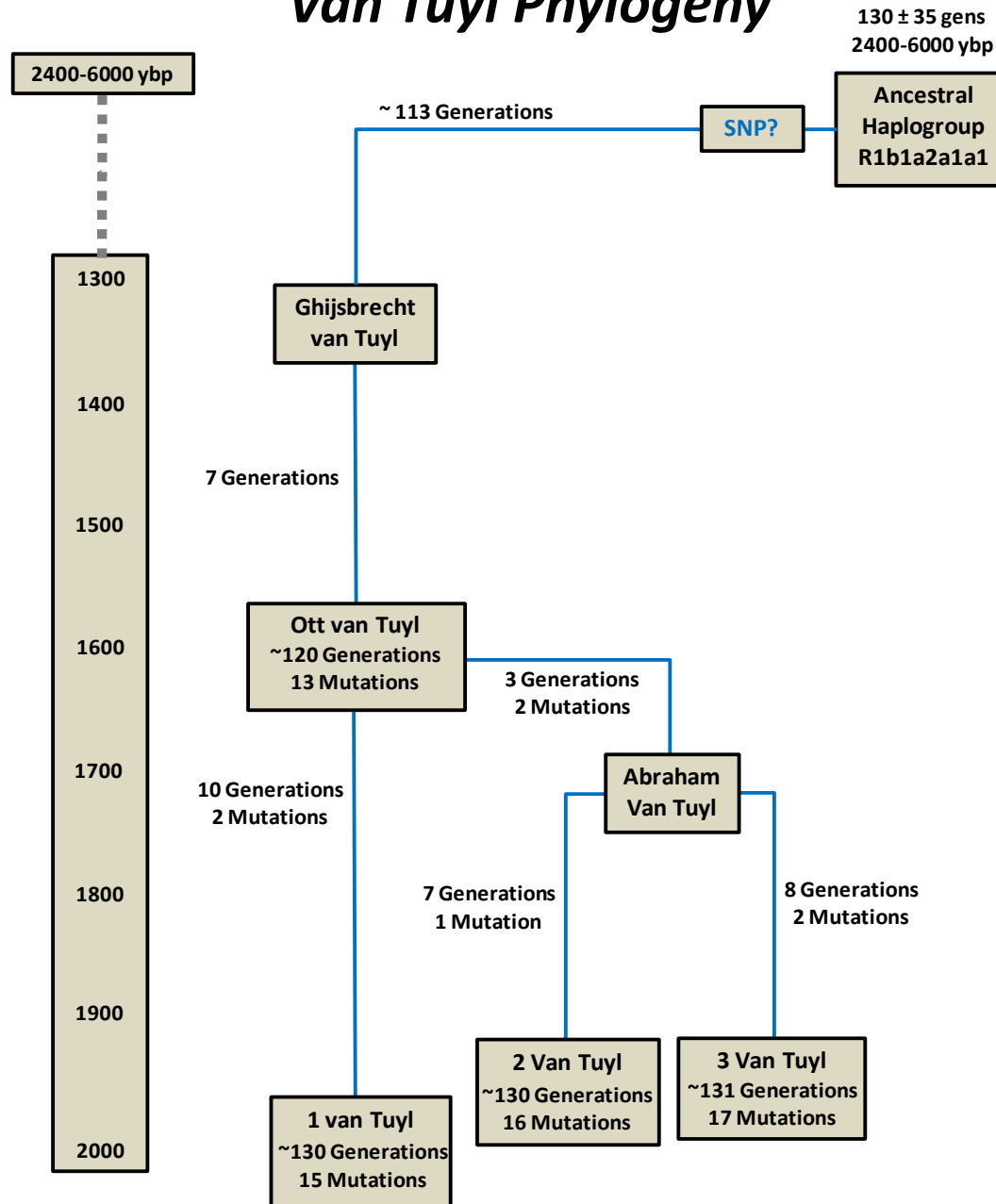
67-Locus Phylogeny for 3 Descendants of Ott Janse van Tuyl



Genetic Distances

Note: 67 Loci

Van Tuyl Phylogeny



What About SNPs?

- The Van Tuyls Descend from Haplogroup R1b1a2a1a1 [R1b – L11]
- What is This Group's Pre-History?
- What Subclades Might The Family Belong To?

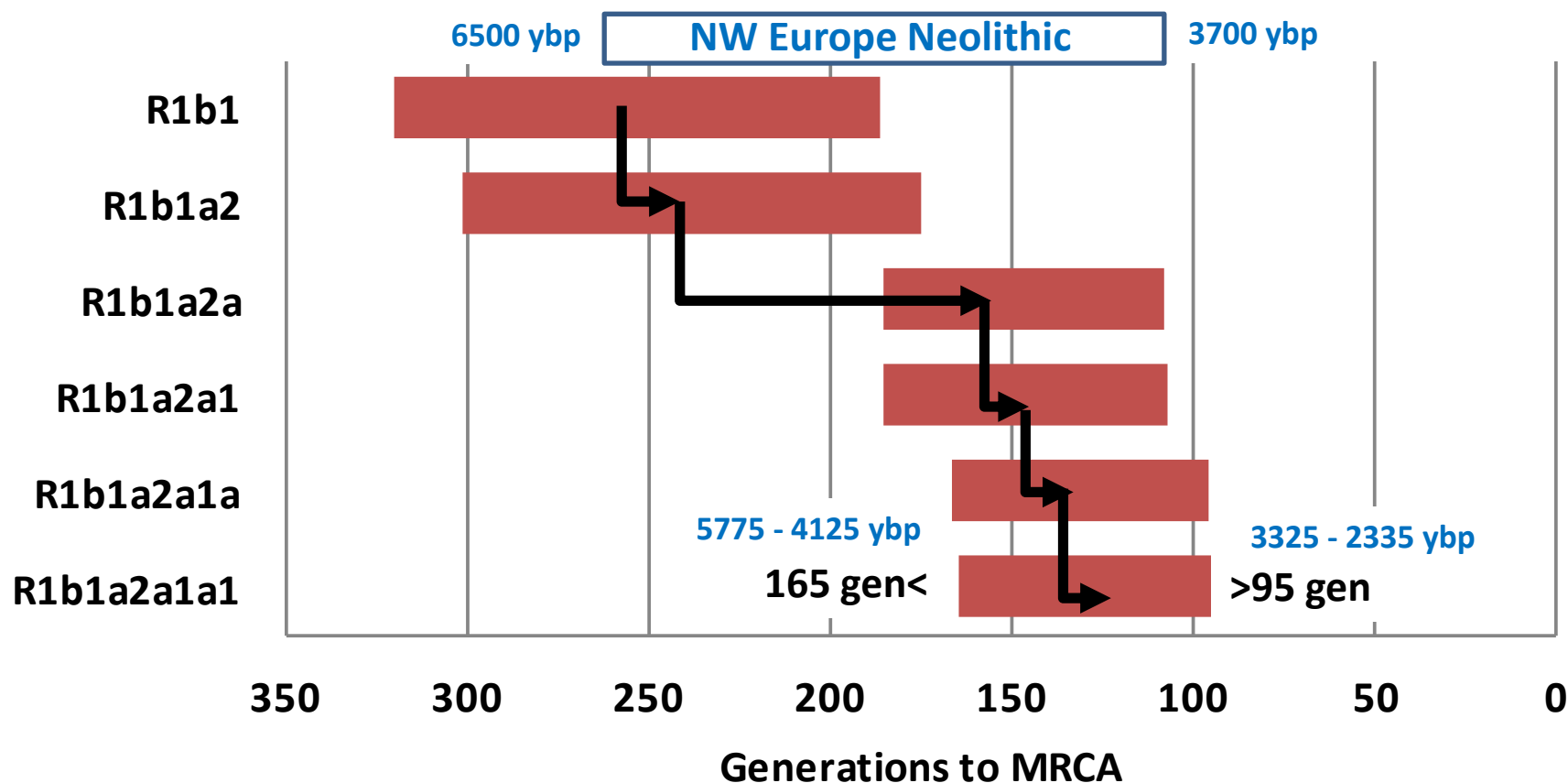
Published Y-STR Mutation Rates Based on Father-Son Observed Mutations

<http://www.yhrd.org/Research/Loci/YGATAH4>

per YHRD: 95% Confidence Levels				
	mean	min CL	max CL	Std Dev
DYS-19	2.30E-03	1.60E-03	3.20E-03	4.00E-04
DYS-393	1.05E-03	5.70E-04	1.75E-03	2.95E-04
DYS-391	2.60E-03	1.84E-03	3.57E-03	4.32E-04
DYS-439	5.20E-03	3.88E-03	6.85E-03	7.43E-04
DYS-389 I	2.52E-03	1.75E-03	3.52E-03	4.43E-04
DYS-389 II	3.64E-03	2.70E-03	4.80E-03	5.25E-04
DYS-390	2.10E-03	1.43E-03	2.98E-03	3.88E-04
DYS-392	4.12E-04	1.50E-04	8.97E-04	1.87E-04
DYS-438	3.10E-04	6.30E-05	8.90E-04	2.07E-04
DYS-439	5.20E-03	3.90E-03	6.80E-03	7.25E-04
DYS-437	1.23E-03	6.30E-04	2.10E-03	3.68E-04
DYS-448	1.57E-03	7.50E-04	2.89E-03	5.35E-04
DYS-456	4.24E-03	2.80E-03	6.20E-03	8.50E-04
DYS-458	6.40E-03	4.60E-03	8.70E-03	1.03E-03
Y-GATA-H4	2.43E-03	1.44E-03	3.84E-03	6.00E-04

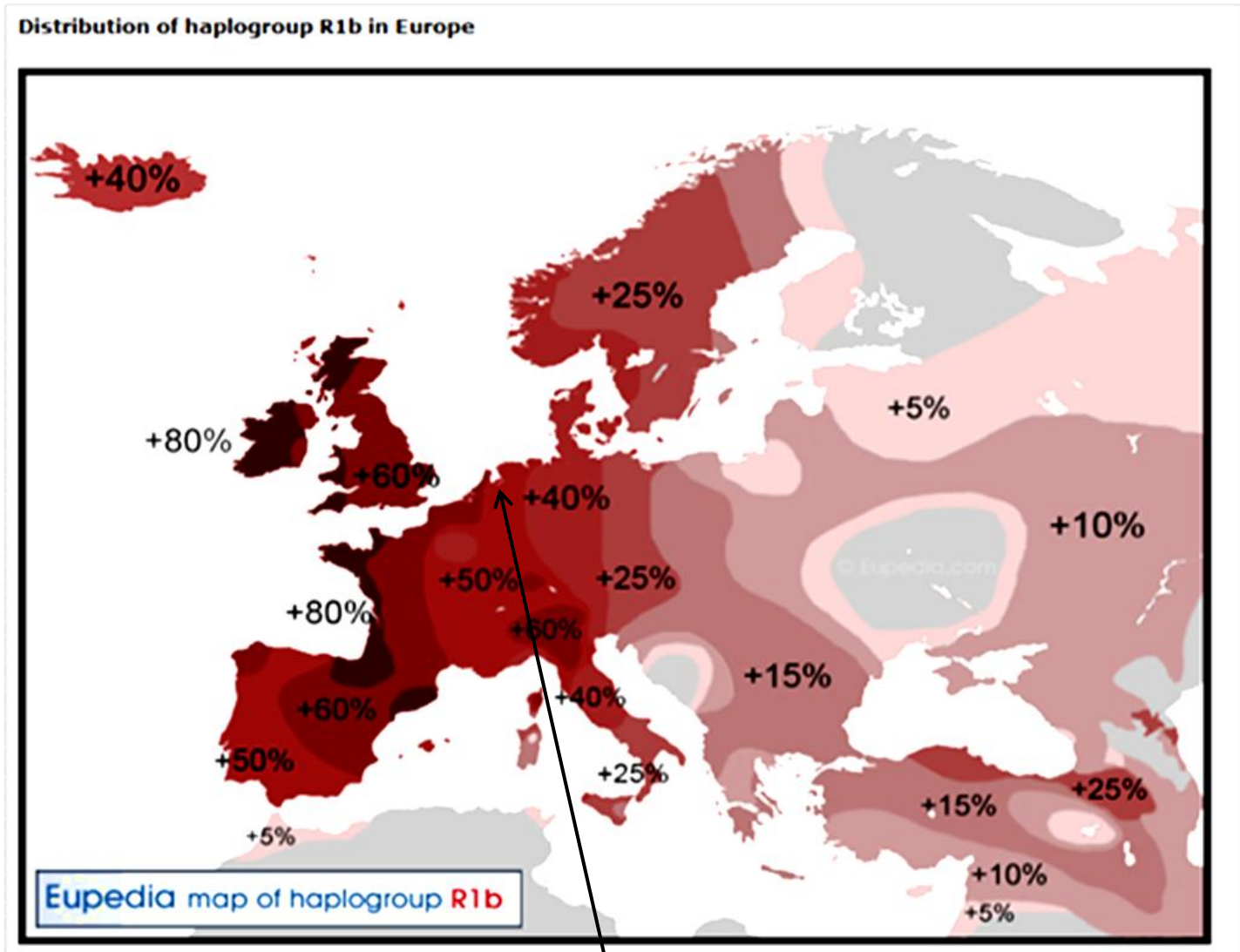
Variances and Mutation Rates of Loci in **Green** were used to estimate the number of generations to Ancestral Group

TMRCA for R1b-P25 and Subclades



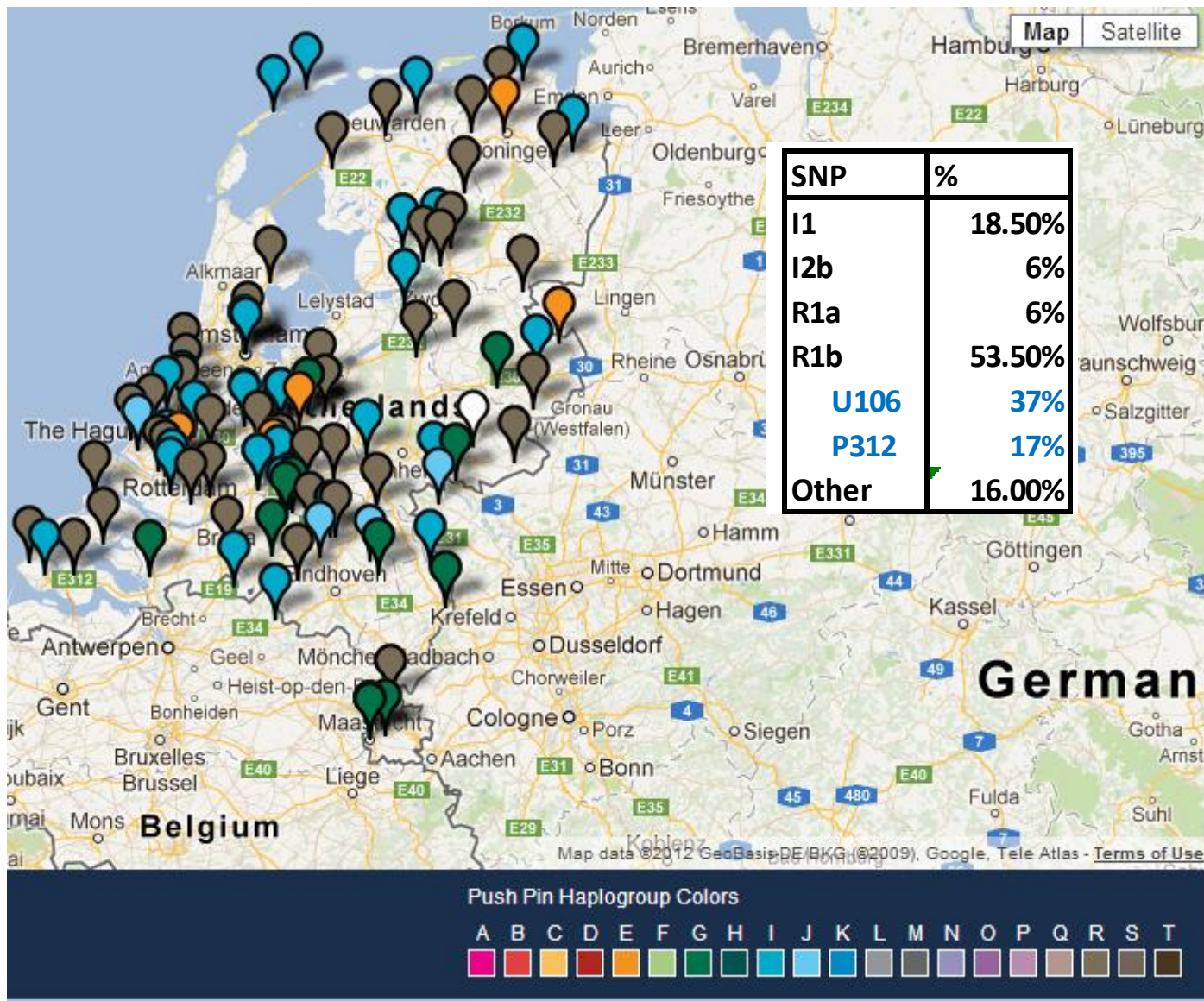
Generations	350	300	250	200	150	100	50	0
YBP @ 35yr/gen	12250	10500	8750	7000	5250	3500	1750	0
YBP @ 25yr/gen	8750	7500	6250	5000	3750	2500	1250	0

European Contour Map --- R1b Clade



R1b: 53.5% Frequency in The Netherlands

Netherlands Map...All SNPs



Netherlands Region Map...U106 Only

37% of Netherlands Ancestors

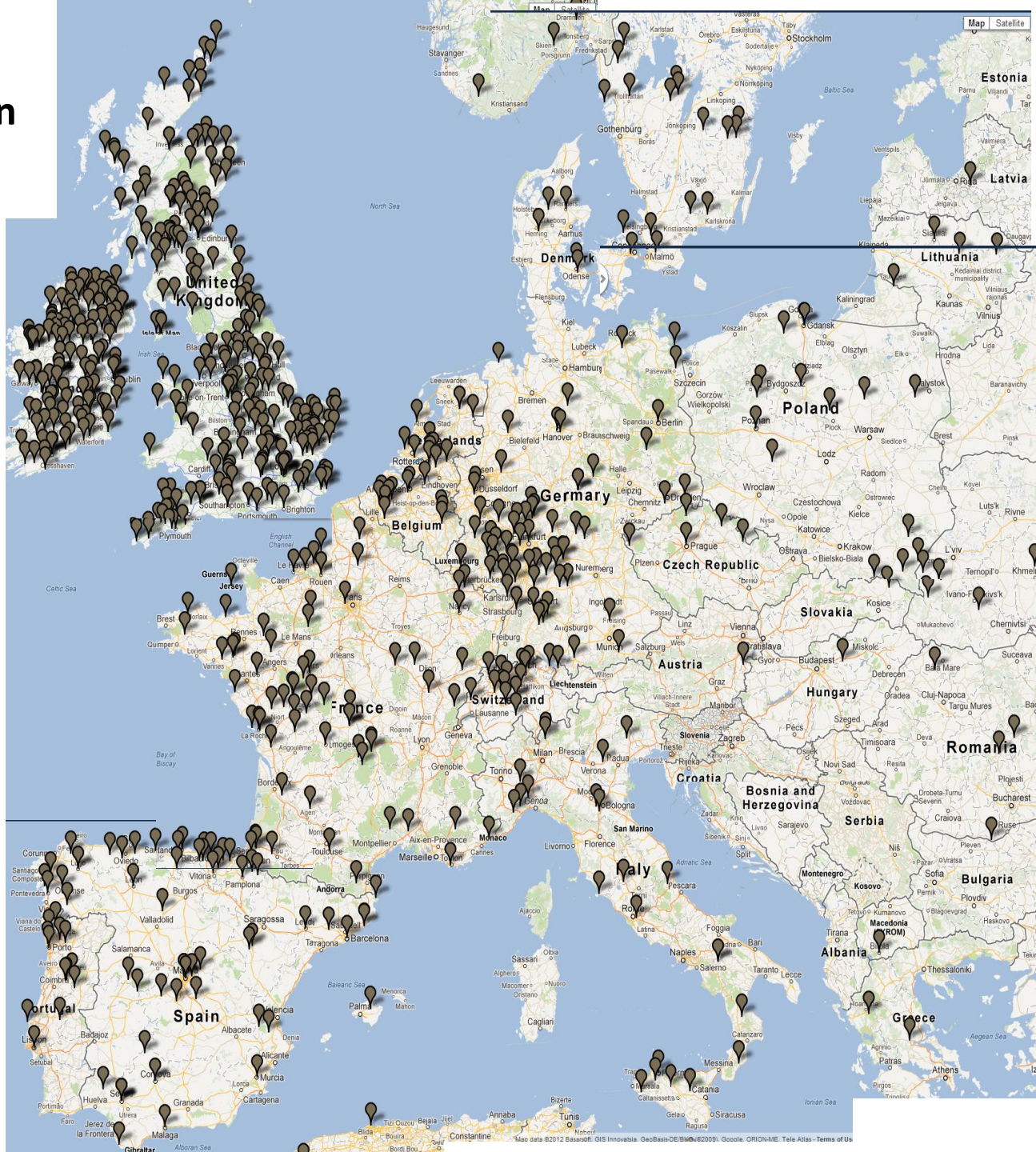


Netherlands Region Map...P312 Only

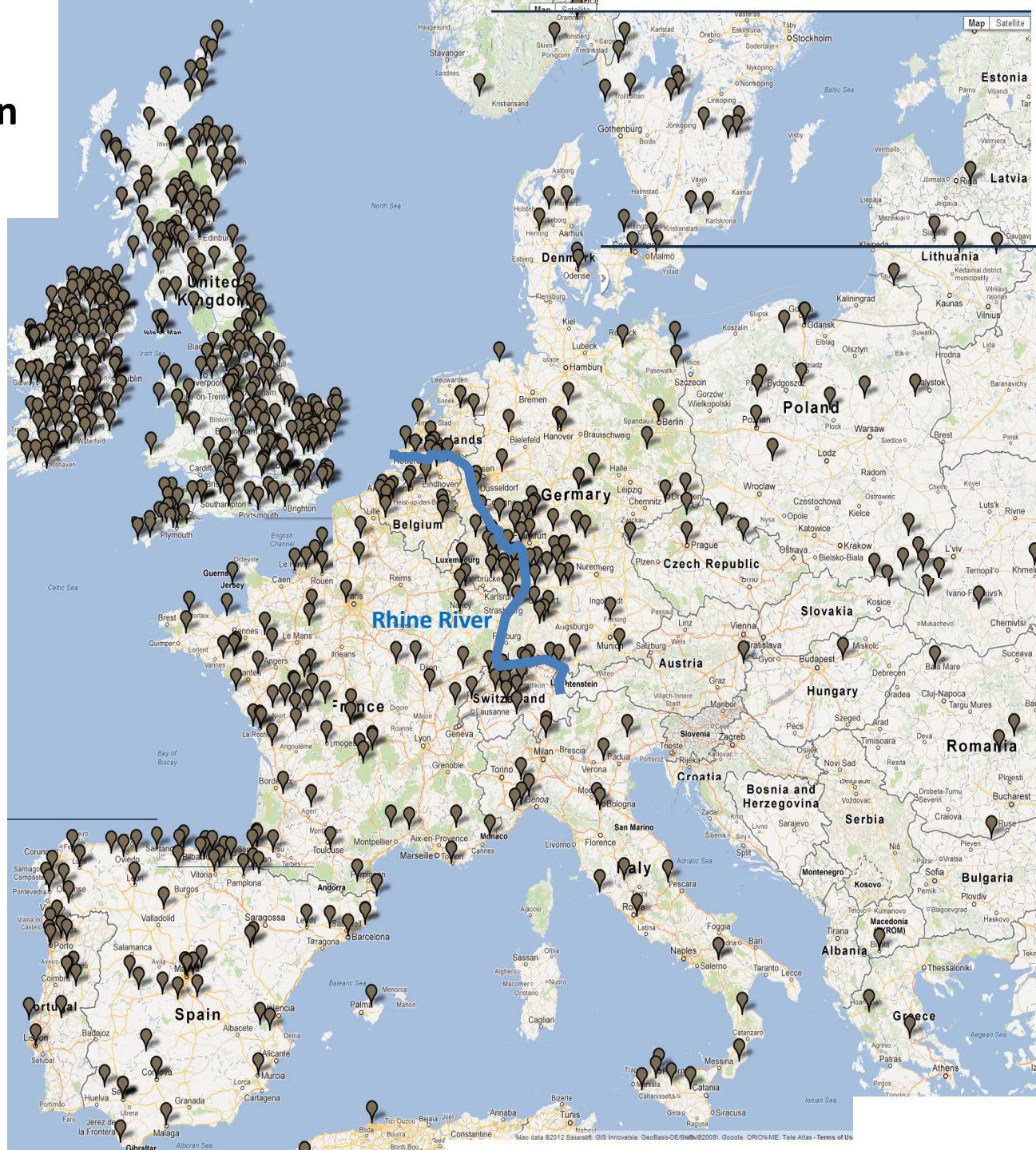
17% of Netherlands Ancestors



P312 in Western Europe



P312 in Western Europe

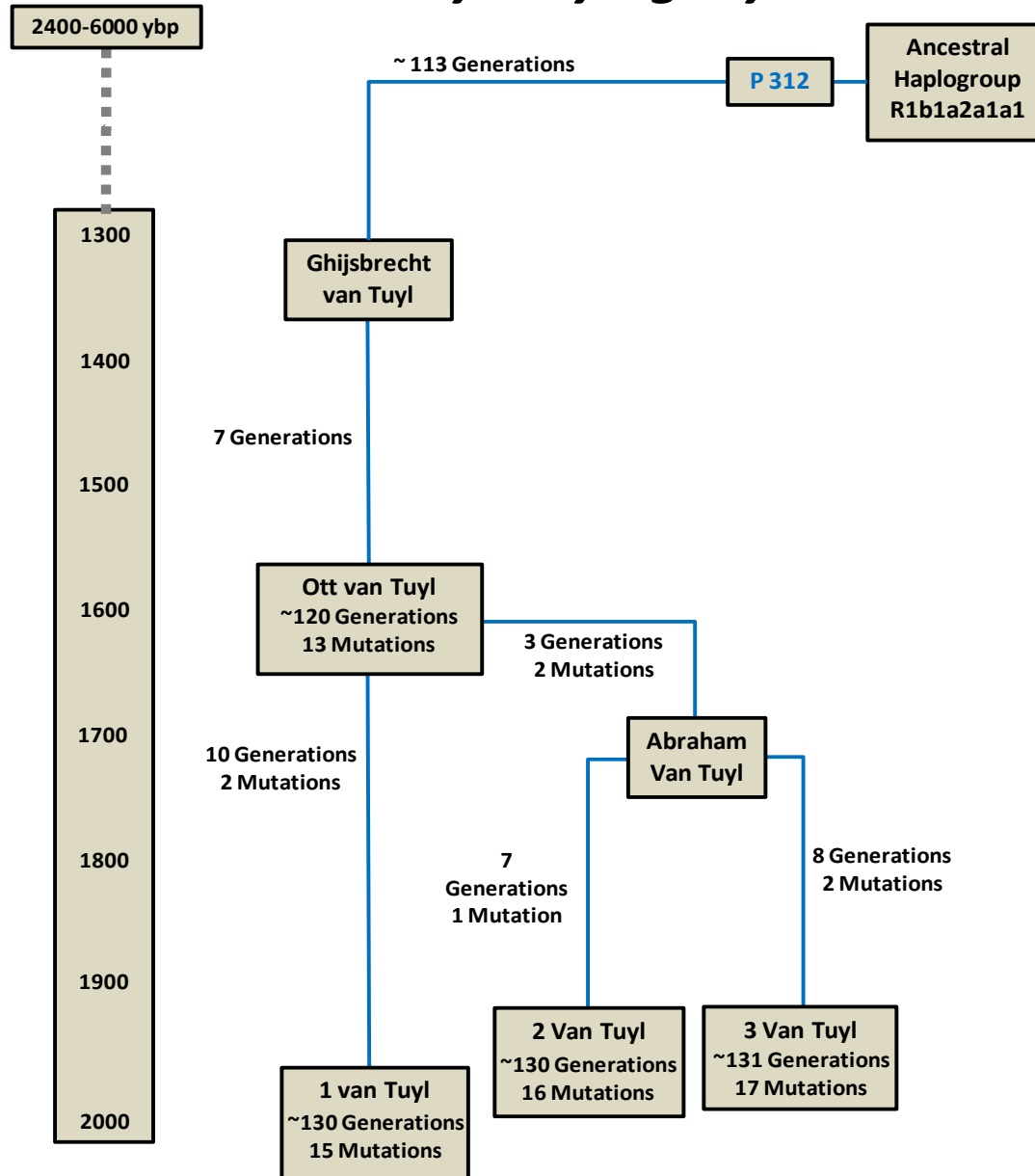


Earliest Known Van Tuyl Ancestor Ghijsbrecht van Tuyl, 14th Century



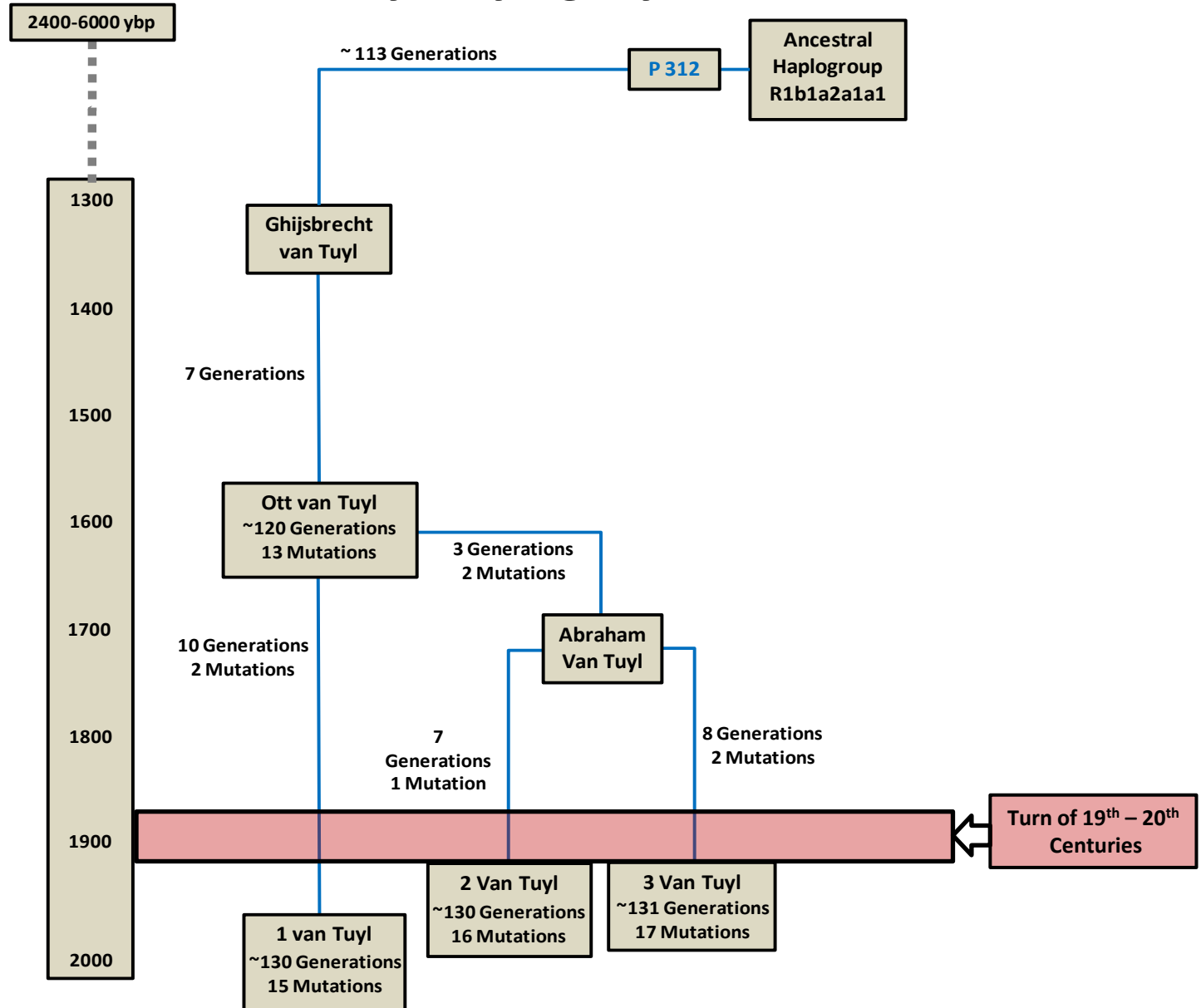
Van Tuyl Phylogeny

130 ± 35 gens
2400-6000 ybp



Van Tuyl Phylogeny

130 ± 35 gens
2400-6000 ybp



Line 3 – *circa* 1918



Line 2 – *circa* 1880s

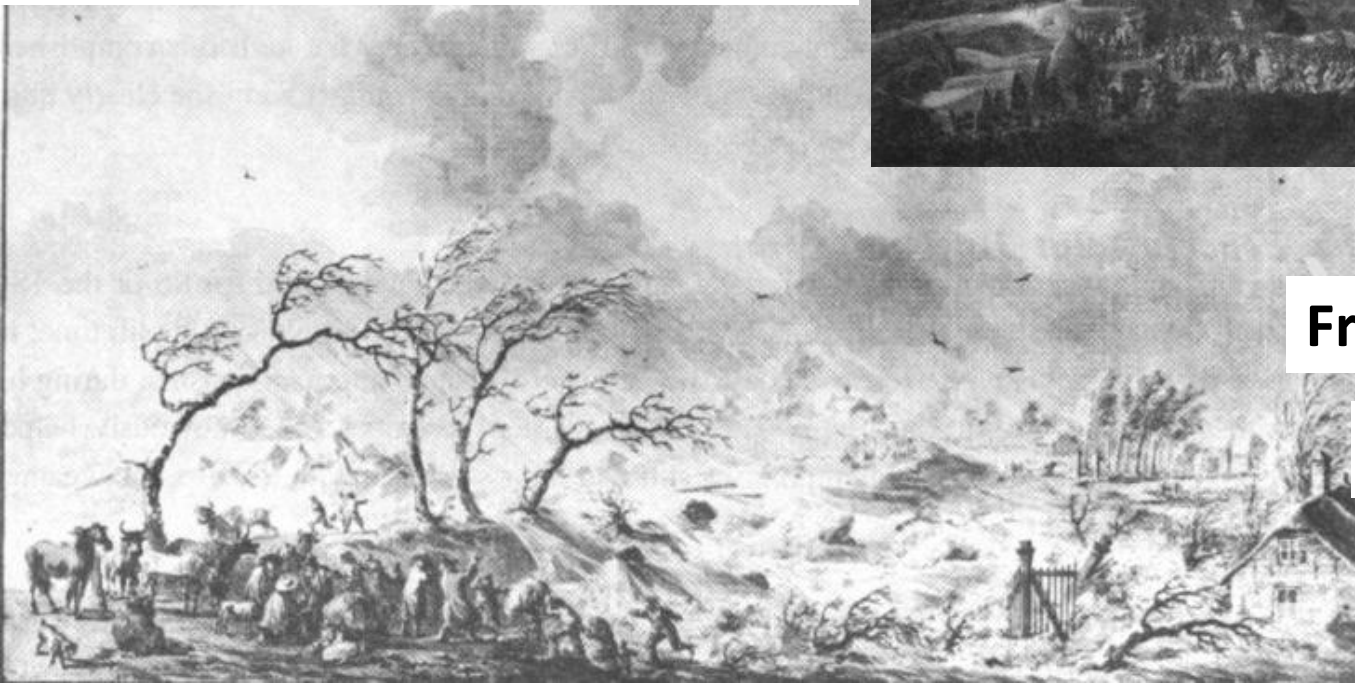


80 Year's War with Spain – 17th c.

Hard Times on the Waal



Dike Breaks – 17th, 18th, 19th c.



French Invasion 17th c.

Cattle Plague 18th c.

Potato Blight 19th c.

Line 1 – *circa* 1900



Two Families “From Tuyl”

The Family van Tuyl



First Mentioned in 14th Century

The Family van Tuyll van Serooskerken



First Mentioned in 16th Century

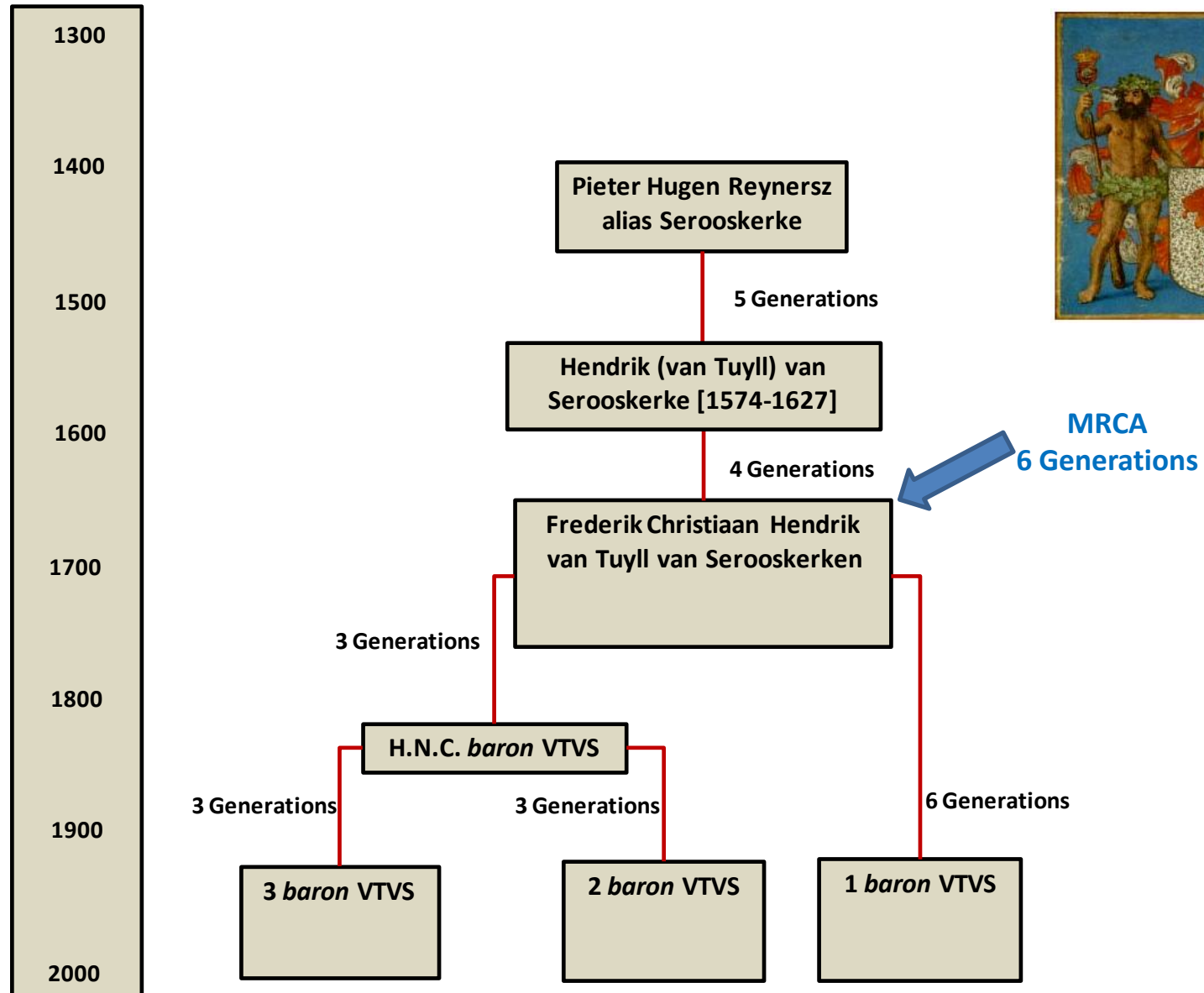


REYNHARD-GERARD V.
TUYL VAN SEROOSKERKEN.



jngekomen A. 1703.

Van Tuyl van Serooskerken Records-Based Phylogeny



Earliest Known Van Tuyl Ancestors of Van Tuyl and Van Serooskerke Families



37 Locus Mutation Results for 3 VTVS Tested

Different from Ancestral
Haplotype R1b1a2a1a1

Different from MRCA OVT

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
2-VTVS	14	24	14	11	11	16	12	12	14	13	13	14
1-VTVS	14	24	14	11	11	16	12	12	14	13	13	14
3-VTVS	14	24	14	11	11	16	12	12	14	13	13	14
MRCA	14	24	14	11	11	16	12	12	14	13	13	14
AHT	13	24	14	11	11	14	12	12	12	13	13	16

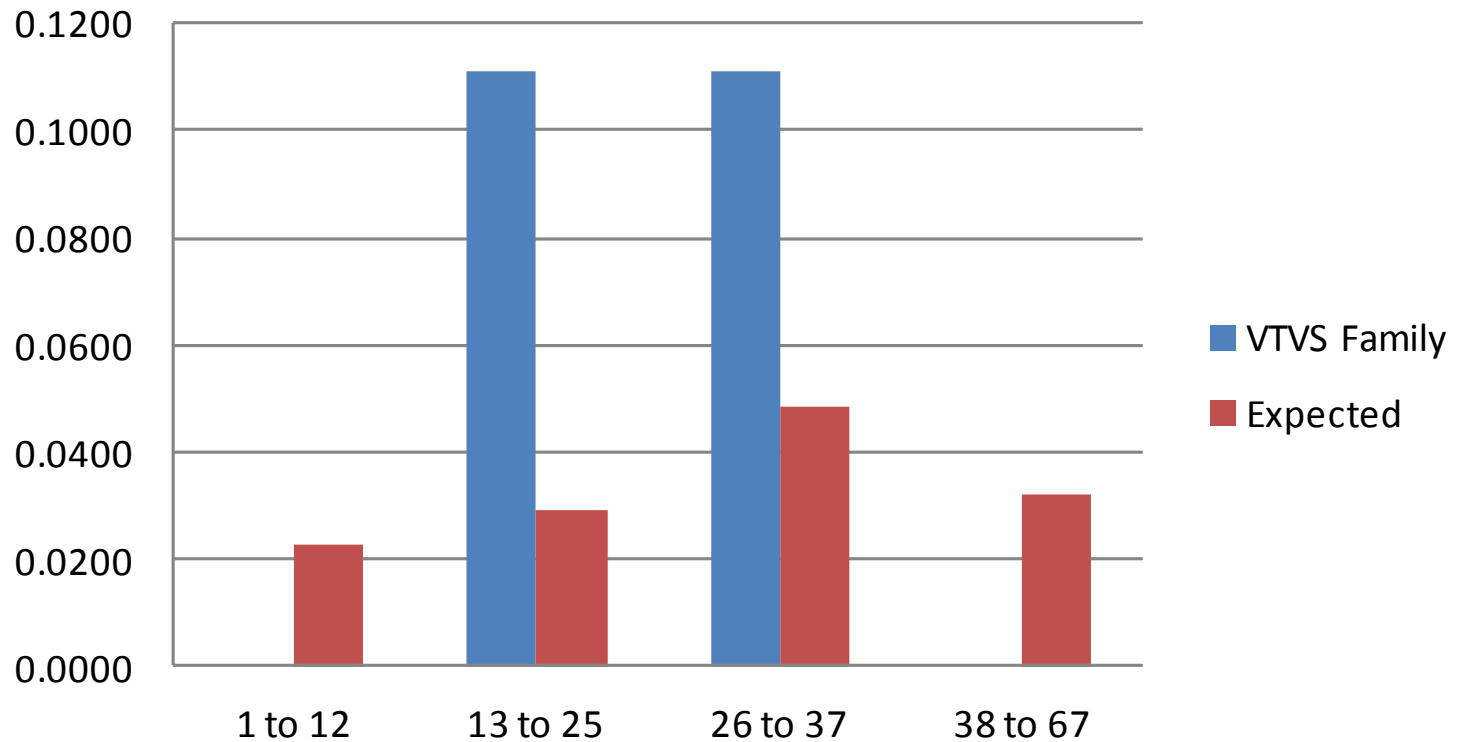
13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
2-VTVS	16	9	10	11	11	26	15	19	29	15	15	17	17
1-VTVS	16	9	10	11	12	26	15	19	29	15	15	17	17
3-VTVS	16	9	10	11	11	26	15	19	29	14	15	17	17
MRCA	16	9	10	11	11	26	15	19	29	15	15	17	17
AHT	17	9	10	11	11	25	15	19	29	15	15	17	17

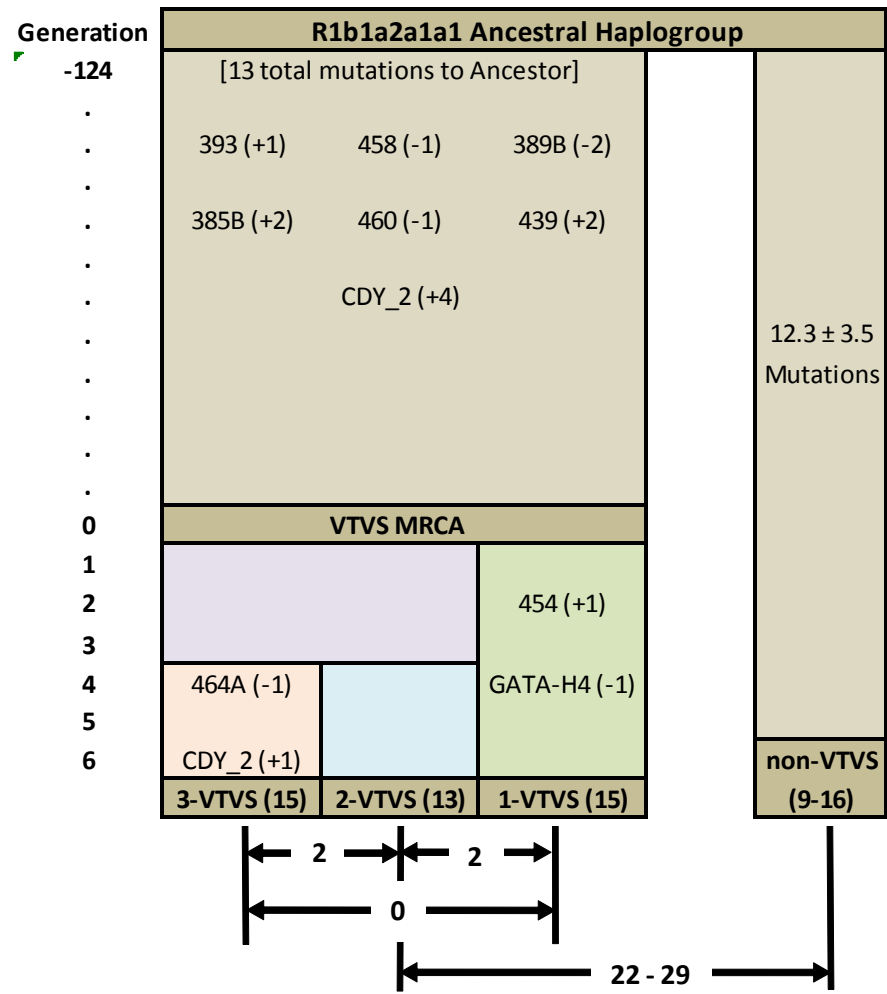
26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
2-VTVS	10	11	19	23	16	15	18	17	36	41	12	12
1-VTVS	10	10	19	23	16	15	18	17	36	41	12	12
3-VTVS	10	11	19	23	16	15	18	17	36	42	12	12
MRCA	10	11	19	23	16	15	18	17	36	41	12	12
AHT	11	11	19	23	15	15	18	17	36	37	12	12

Actual vs Expected Mutation Rate for VTVS Family

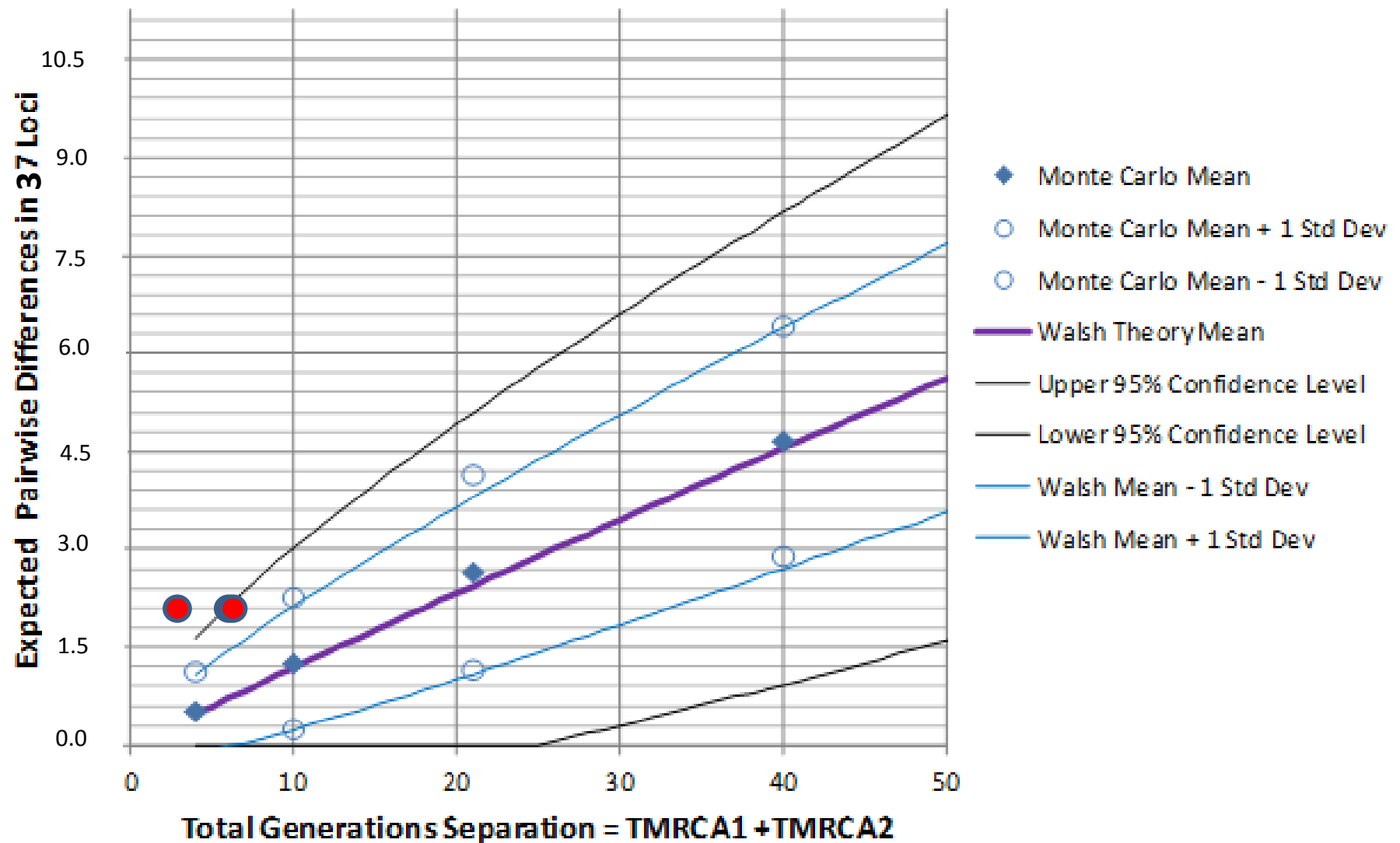


37-Locus Phylogeny for Van Tuyll van Serooskerken Descendants



Note: 37 Loci

Expected Pairwise Differences in 37 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



8 Loci in 37 Have Evolved from Ancestral Haplotype

Different from Ancestral
Haplotype R1b1a2a1a1

Different from MRCA

1-12

	1	2	3	4	5	6	7	8	9	10	11	12
Name	DYS393	DYS390	DYS19	DYS391	DYS385a	DYS385b	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
2-VTVS	14	24	14	11	11	16	12	12	14	13	13	14
1-VTVS	14	24	14	11	11	16	12	12	14	13	13	14
3-VTVS	14	24	14	11	11	16	12	12	14	13	13	14
MRCA	14	24	14	11	11	16	12	12	14	13	13	14
AHT	13	24	14	11	11	14	12	12	12	13	13	16

13-25

	13	14	15	16	17	18	19	20	21	22	23	24	25
Name	DYS458	DYS459	DYS459	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464a	DYS464b	DYS464c	DYS464d
2-VTVS	16	9	10	11	11	26	15	19	29	15	15	17	17
1-VTVS	16	9	10	11	11	26	15	19	29	15	15	17	17
3-VTVS	16	9	10	11	11	26	15	19	29	14	15	17	17
MRCA	16	9	10	11	11	26	15	19	29	15	15	17	17
AHT	17	9	10	11	11	25	15	19	29	15	15	17	17

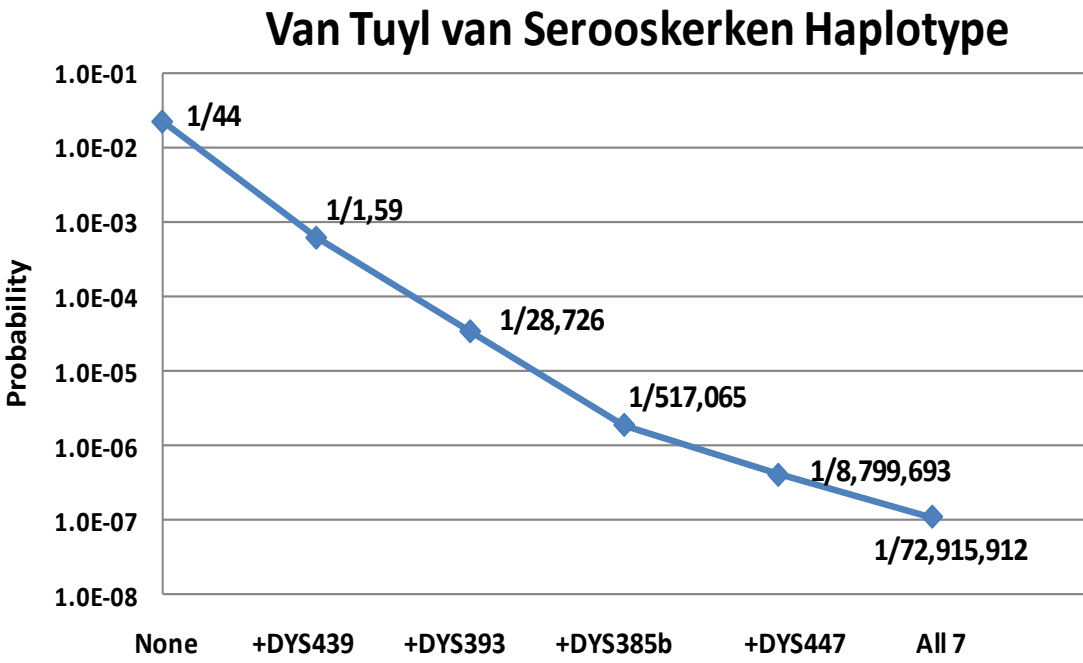
26-37

	26	27	28	29	30	31	32	33	34	35	36	37
Name	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY_1	CDY_2	DYS442	DYS438
2-VTVS	10	11	19	23	16	15	18	17	36	41	12	12
1-VTVS	10	10	19	23	16	15	18	17	36	41	12	12
3-VTVS	10	11	19	23	16	15	18	17	36	42	12	12
MRCA	10	11	19	23	16	15	18	17	36	41	12	12
AHT	11	11	19	23	15	15	18	17	36	37	12	12

Van Tuyll van Serooskerken Haplotype Has High Selectivity and Stability

Locus	R1b1a2a1a1 Haplotype		VTVS Haplotype	Selection Ratio	Avg. Gen to Mutation
HT Mode				44	
DYS-439	12	>>>>>>>	14	36	299
DYS-393	13	>>>>>>>	14	18	455
DYS-385b	14	>>>>>>>	16	18	126
DYS-447	25	>>>>>>>	26	5	244
CDY-2	37	>>>>>>>	41	4	98
DYS-460	11	>>>>>>>	10	3	510
DYS-458	17	>>>>>>>	16	2	134

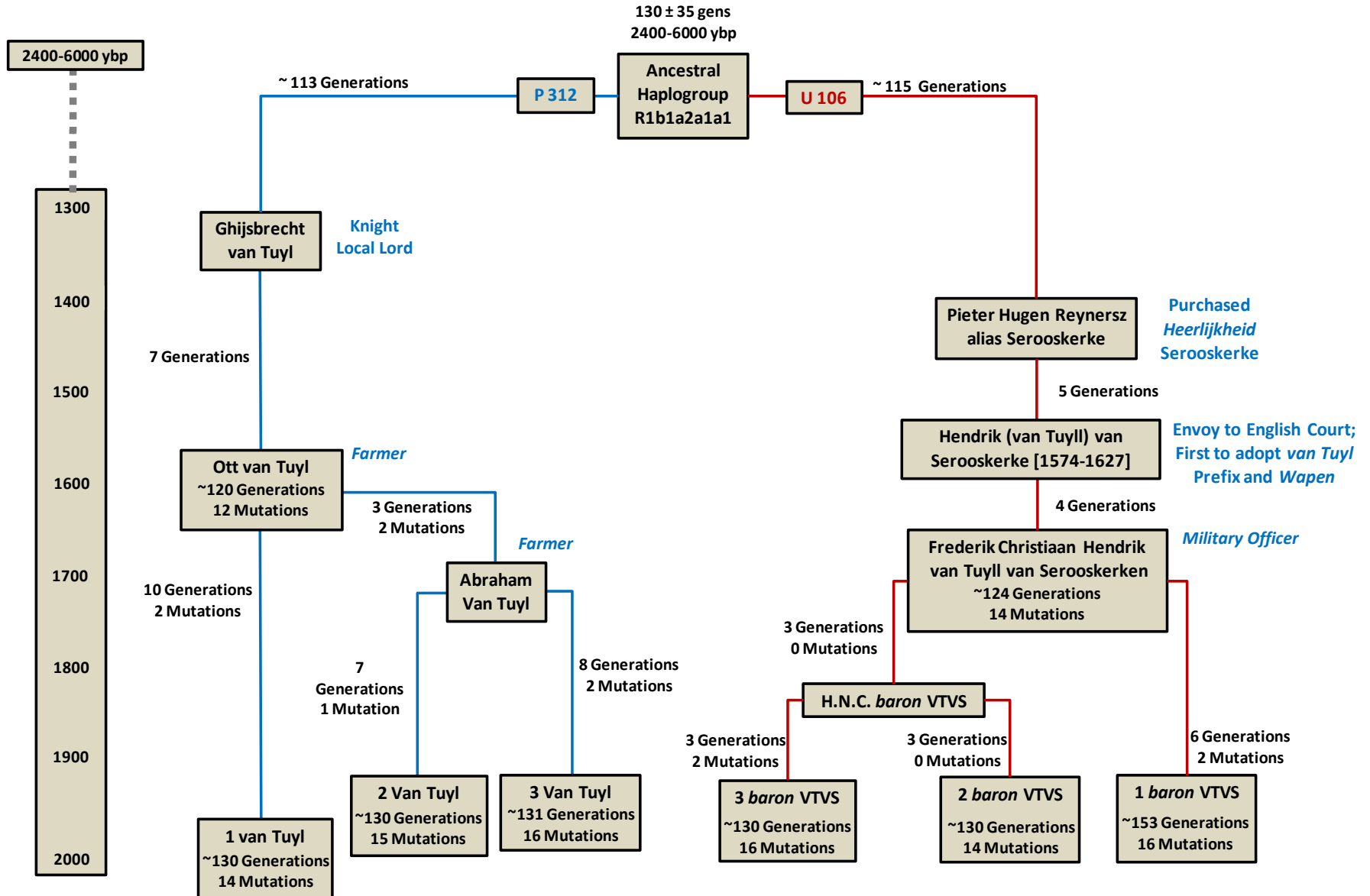
98 – 510
Generations
Between
Mutations



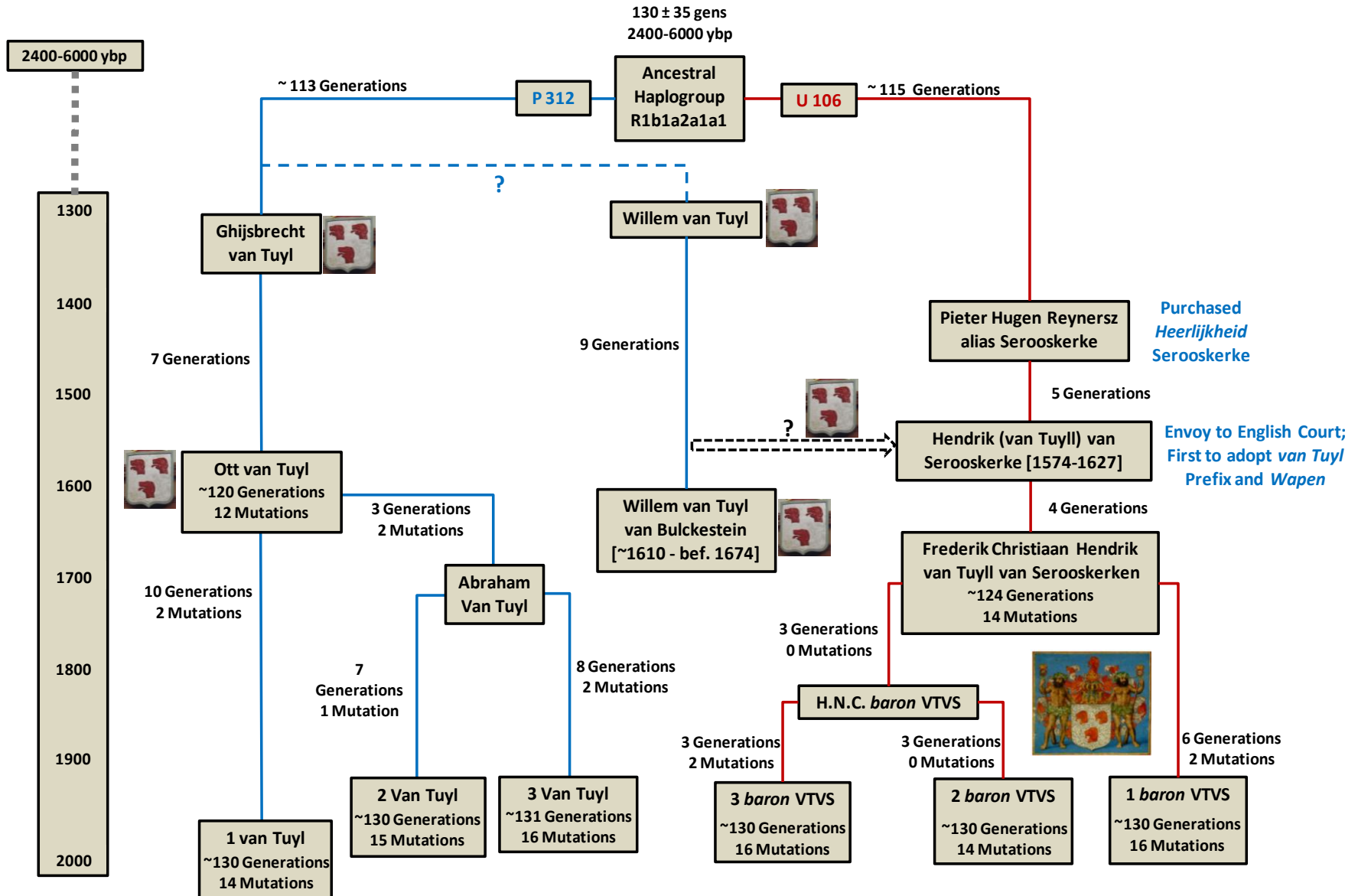
Earliest Known Van Tuyl Ancestors of Van Tuyl and Van Serooskerke Families



Van Tuyl, van Tuyll van Serooskerken Phylogeny



Van Tuyl, van Serooskerken, van Bulckstein Phylogeny



A Tale of Two Families

Van Tuyl



Van Tuyll van Serooskerken

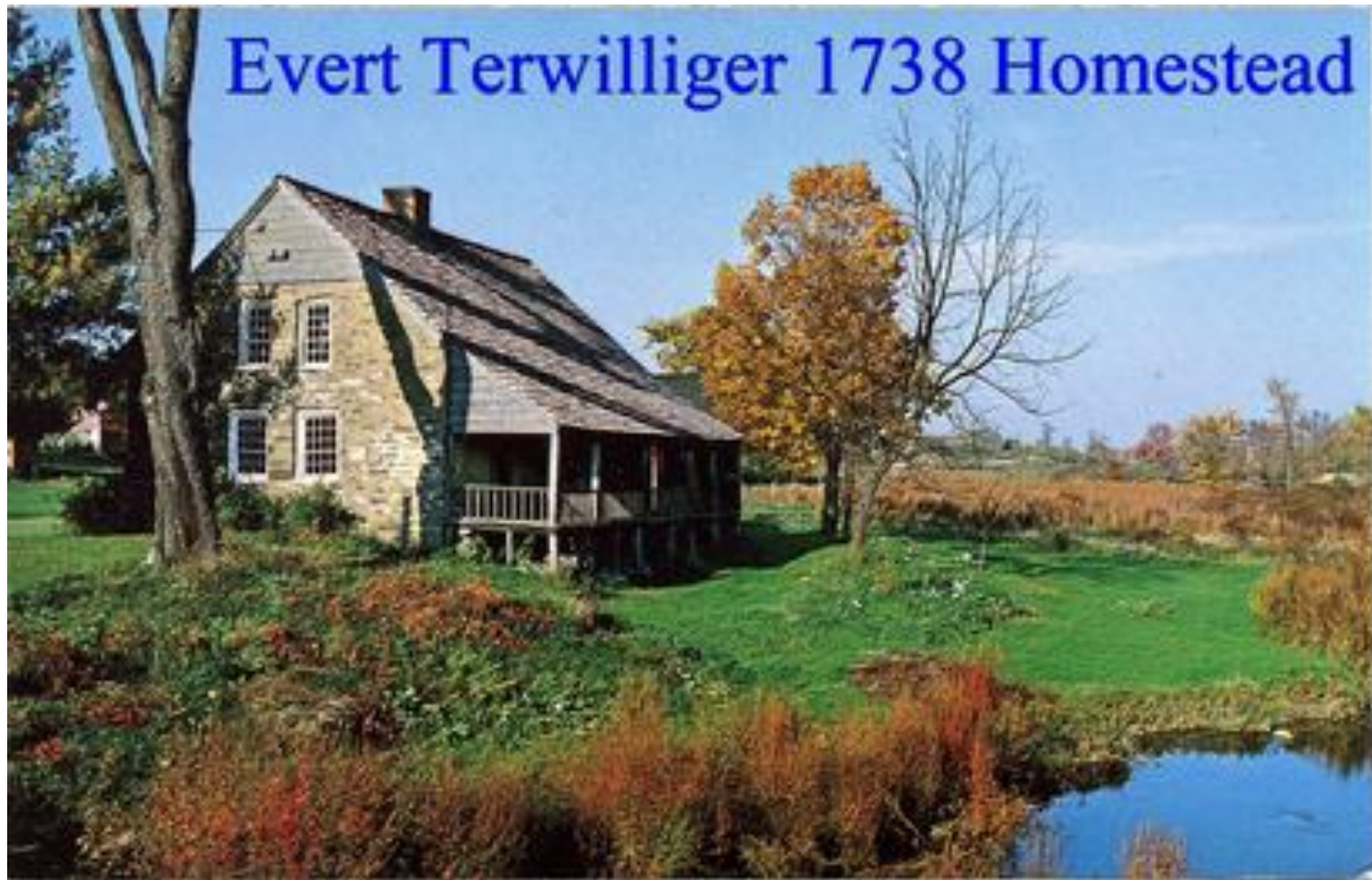


The Case of the 1850s Adoptee

- Adopted in New York State by Van Tuyl couple
- Family tradition said he was born “McCreary”
- Was this true?
- Where did the birth family come from?

The Case of the 1850s Adoptee

- Descendant was I1 – clearly **not** a Van Tuyl
- No match for McCreary and variants on FTDNA
- However...An intriguing match jumped out!
- The Terwilliger Family, extensively tested by FTDNA, was a very close match.



The Terwilliger Family, from Vianen near Utrecht, settled in New Paltz in 1663

37 Locus Mutation Results for 5 Terwilligers and a Van Tuyl

Ancestor	DYS393	DYS390	DYS19	DYS391	DYS385i	DYS385ii	DYS426	DYS388	DYS439	DYS389i	DYS392	DYS389b
I - Solomon	13	22	15	10	13	14	11	14	11	12	11	28
II - Matheus	13	22	15	10	13	14	11	14	11	12	11	28
III - Manuel	13	22	15	10	13	14	11	14	11	12	11	28
IV - Johannes	13	22	15	10	13	14	11	14	11	12	11	28
V - Evert	13	22	15	10	13	14	11	14	11	12	11	28
Terwilliger Mode	13	22	15	10	13	14	11	14	11	12	11	28
Ancestral Mode	13	22	14	10	13	14	11	14	11	12	11	28
Van Tuyl	13	22	15	10	13	14	11	14	11	12	11	28

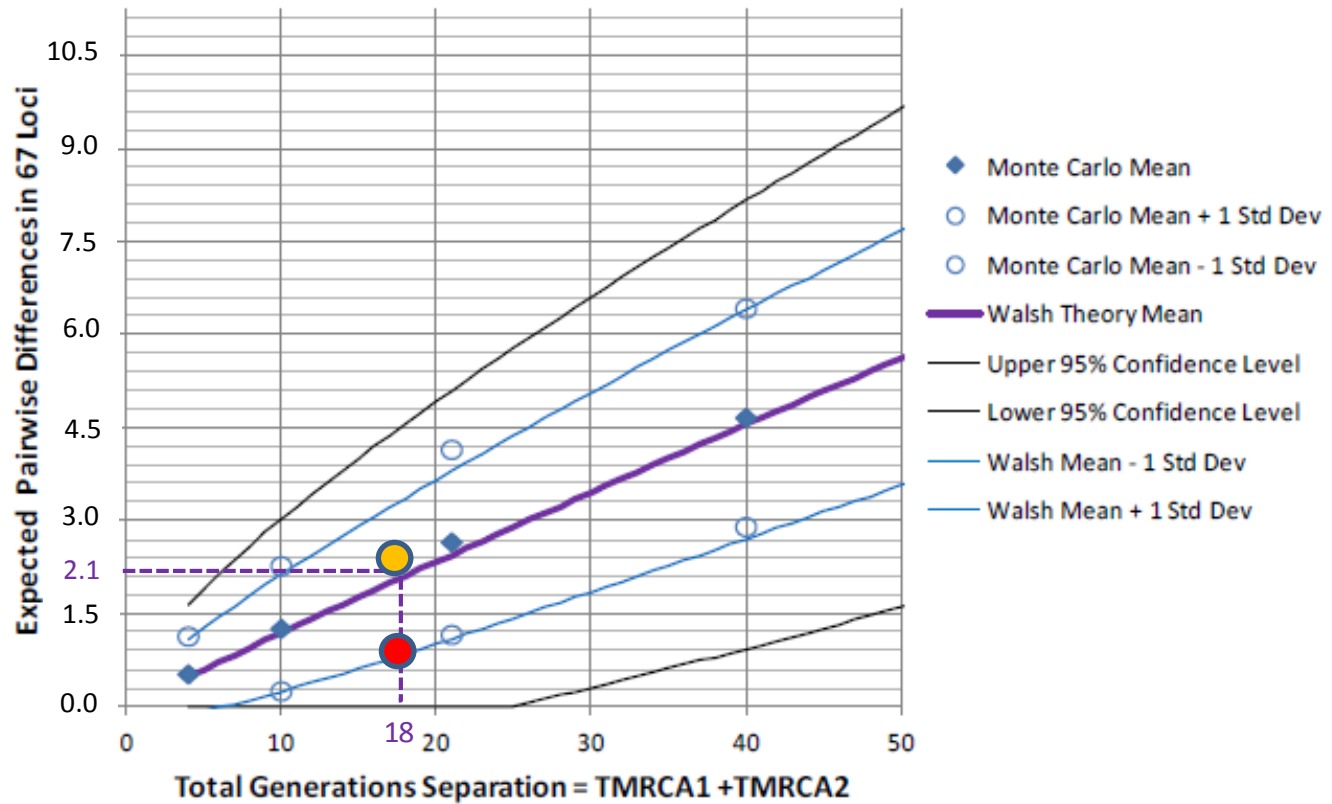
Ancestor	DYS458	DYS459a	DYS459b	DYS455	DYS454	DYS447	DYS437	DYS448	DYS449	DYS464-1	DYS464-	DYS464-3	DYS464-
I - Solomon	15	8	9	8	11	22	16	20	28	14	15	15	15
II - Matheus	15	8	9	8	11	22	16	20	28	14	15	15	15
III - Manuel	15	8	9	8	11	22	16	20	28	14	15	15	15
IV - Johannes	15	8	9	8	11	22	16	20	28	14	15	15	15
V - Evert	15	8	9	8	11	22	16	20	28	14	15	15	15
Terwilliger Mode	15	8	9	8	11	22	16	20	28	14	15	15	15
Ancestral Mode	15	8	9	8	11	23	16	20	29	12	14	15	16
Van Tuyl	15	8	9	8	11	22	16	20	28	14	14	15	15



Ancestor	DYS460	Y-GATA-H4	YCA-IIa	YCA-IIb	DYS456	DYS607	DYS576	DYS570	CDY-1	CDY-2	DYS442	DYS438
I - Solomon	10	10	19	21	14	14	16	19	34	34	12	10
II - Matheus	10	10	19	21	14	14	16	19	34	35	13	10
III - Manuel	10	10	19	21	14	14	16	19	34	35	12	10
IV - Johannes	10	10	19	21	14	14	16	19	35	35	12	10
V - Evert	10	10	19	21	14	14	16	19	34	35	12	10
Terwilliger Mode	10	10	19	21	14	14	16	19	34	35	12	10
Ancestral Mode	10	10	19	21	14	14	16	20	35	37	12	10
Van Tuyl	10	10	19	21	14	14	16	20	34	35	12	10



Expected Pairwise Differences in 37 Loci -vs- Total Generations of Separation for Monte Carlo Simulation and Walsh Infinite Alleles Theory



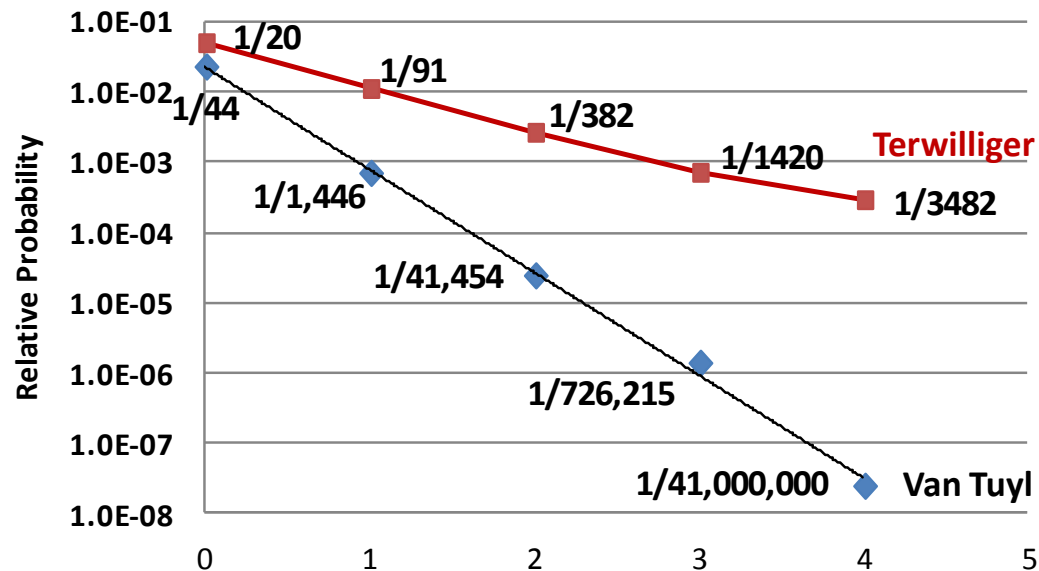
● = Terwilliger Data

● = Van Tuyl Data

Terwilliger Haplotype Has Low Selectivity but High Stability

Locus	I-1 Haplotype		Terwilliger Haplotype	Selection Ratio	Avg. Gen to Mutation	
I1 Mode				20		
CDY-2	37	>>>>>>>	35	4	98	} 98 – 725 Generations Between Mutations
DYS-19	14	>>>>>>>	15	4	725	
DYS-447	23	>>>>>>>	22	4	244	
CDY-1	35	>>>>>>>	34	2	116	

Van Tuyl and Terwilliger Haplotypes



Phillipsport:
Peter Terwilliger
b. 1830

Van Tuyl
Walkill Town
1850

2 miles

2 mi
5 km

Genealogical Highlights

- A compelling case was made for Terwilliger paternity of the 1850s Van Tuyl adoptee
- Terwilliger Haplotype less selective than VT and VTVS
- You really can find useful matches with Y-STR Analysis!

Overall Technical Highlights

- Monte Carlo simulation revealed variability of mutation rate and poor accuracy for time dating
- Using variances for loci in FTDNA Haplogroup projects, an ancestral haplotype for R1b1a2a1a1 was constructed and dated
- Using similarities, rather than differences, proved to be a powerful analytical technique
- Unique haplotypes for three families were developed and analyzed as to selectivity and stability

Recommendations

- Check for Terminal SNP first
- Knowing Your Ancestral Haplotype, develop a Personal or Family Haplotype
- Compute Likelihood of Relationships Based on this Haplotype
- Don't try to Estimate TMRCA from Y-STR Data
- Report Your Findings



Thank You

