NOTES: (These Notes also serve the McCarthy R-L21 Group B tree maintained independently as a subset of this R Z16526 tree: see continuation at R-ZS4606 on Sheet 3)

1. Where SNP / InDel Y-chromosome positions are cited, these relate to Human Reference Genome 'Build 38' (hg38 / GRCh38).
2. Dates shown in the key diagram on this sheet 1 or as 'Guide' dates on the detailed tree of sheets 2-5 have been computed using counts of all mutations, i.e. both SNPs (subject to certain qualifying restrictions) and FTDNA Panel 1-7 STR mutations. They are intended for guidance only. The start date for R-L21 (or rather the midpoint of the L21 block, comprising SNPs L21 and L459) is nominally 2,500 B.C. (BCE), estimated from reported radio carbon dating of ancient bones. This may be adjusted as more information comes to light. Otherwise, dates are estimates for the LAST mutation in the block in which each representative SNP occurs, i.e for the most recent shared (or common) ancestor (MRCA) of all who connect through subsequent branches. As explained in Note 4, this is not necessarily the SNP shown in the key diagram on this sheet 1 and could be an STR mutation or any other 'equivalent' SNP or InDel within a block.
3. (Not used)
4. Within blocks of 'equivalent' SNPs and / or associated STRs, the mutations could have occurred in any order.
5. It is likely that bases marked with this note participated in a Multiple Nucleotide Polymorphism (MNP). However, since it is much easier for SNP interpretation software to handle single base substitutions rather than complex mutations, they are usually treated as separate SNPs.
6. (Not used)
7. Recurrent. Also seen in at least one other DF21+ /FGC18205- sample.
8. Where tested (or, for P6 and P7, where called).
9. Placement of this mutation subject to further investigation.
10. Result uncertain. Needs Sanger Sequencing test to confirm.
11. (Not used)
12. SNP (or InDel) may have occurred further up the tree but not as far up as the next level on which SNPs occur.
13. Mutation(s) may have occurred further up the tree.
14. Purported SNP within the 125 bp repetitive zone known as DYZ19 (20054914 to 20351054 (hg38)). Cannot be confirmed by Sanger Sequencing.
15. In a sequence with over 95% similarity with another chromosome. Only valid if phylogenetically consistent across two or more participants with other matching. Unlikely to be suitable for Sanger Sequence testing.
15a. SNP occurs in a sequence also found in other chromosomes but presence is consistent here. Not suitable for individual (Sanger Sequence) testing.
16. May be difficult or impossible to confirm by Sanger Sequencing.
17. The presence of palindromic SNP A21813 - in a region 100% identical to that around position 18776409 - in kits other than 708549 is refuted by FTDNA; however review of raw data BAM files has justified the configuration as shown on the tree, and this is now supported by the sharing of these STR mutations by the same kits.
18. A defining SNP or InDel appears to exist on the Y-chromosome, but its location is uncertain. (Frequently this is because it is on a palindromic arm). Unlikely to be suitable for individual (Sanger Sequence) testing.
19. SNP occurs within a STR and may therefore be unreliable. May also be seen elsewhere but phylogenetically consistent where Note applied.
19a. As Note 19, but here the alternative occurrences are at the interface of two motifs counted within DYS390. A third alternative is the loss of two motifs.
20. (Not used)
21. Mutation evident from BigY-700 extraction only; Big Y-500 extraction reported normal allele.
22. Mutation evident from BigY-500 extraction only; Big Y-700 extraction reported normal allele.
22a. Big Y-700 indicates an allele of 11 at FTY145 but the mutation to 12 indicated by Big Y-500 is phylogenetically consistent: see further up the tree.
23. The allele at DYS546u4 frequently appears as 15 or 17 within subclades on this tree but 15 or 18 elsewhere; this may be due to instability or to a problem measuring the allele. Identification of mutations at this marker may therefore be suspect.
23a. FTY690 is rarely read, but when it is the allele may be reported as 8 or 16 even for different reads of the same sample (apart from other values close to 16). This suggests a problem reading it rather than a 16 to 8 mutation.
24. SNPs from ZS4596 down to ZS4611 are negative in Doherty kit no. 177987 but unknown in Driscoll kit no. 21275; SNPs from L362 down to ZS4613 are negative in both these kits. The remaining SNPs / InDel (from InDel ZS4607 to SNP Z29541) require further investigation in both these kits.
25. CDYa/b are the fastest mutating markers so whether CDYb occurred independently or in a common ancestor can only be ascertained by finding a clutch of other shared mutations through testing to 111 STRs and / or SNP testing (such as Big Y).
26. Placement of Long under A5813 and A9070 is tentative.
27. Additionally tested at Genetree: DYS468: 29; DYS527a/b: 19-21; DYS588: 18. Also tested at Genetree, with results consistent with those extracted from Big Y as shown here, were DYS453, 484 and 539.
28. For further exploration of this subclade please refer to https://www.familytreedna.com/public/Hatcher/default.aspx
29. 32609 McLelland results shows a 12>11 mutation at DYS 425 while N27808 Dannehy shows a zero value. While the zero value does occur from time to time (e.g in haplogroup E1b1b1), DYS 425 has a reputation as difficult to read. It is suspected that a return of 11 may be seen in some of the other Dann(ei)hy kits when extended to 67 markers.
30. Instead of sharing the DYS607: 15>16 mutation with other kits as currently shown, kit 553862 may be placed closer to the Porters through a shared DYS504: 15>14 mutation.

IMPORTANT NOTICES

1. **The genetic data used to construct this tree comes principally from Family Tree DNA (FTDNA). Some data has come from testing at YSEQ. Any substantial SNP testing elsewhere will be as indicated by Legend item (b).**
2. **The tree serves the R Z16526 and Subclades Project. Analysis has shown that SNP ZS4606 on Sheet 3 heralds the progeny of Cárthach, i.e the M(a)cCarthy kings of Cashel and Desmond. Their phylogeny has been moved to an independently managed McCarthy Surname Study tree (for McCarthy R-L21 Group B). However the Notes, Legend and Timeline on this Sheet 1 are shared by both trees.**

   The tree shows the probable pathway of the paternal genetic ancestries of the project's members (and of the pre-2nd millenium ancestry of the M(a)cCarthy kings of Cashel and Desmond) from the time of SNP R-L21 (via R-Z16526). To provide such information, additional data has been mined over a number of years from other projects displaying it in the public domain; in this respect, thanks are due to the haplotype owners and their project administrators for making their data available in the spirit of 'citizen science' for the mutual benefit of all concerned. Participant identities abide by the criteria of (5) below. Projects from which haplotypes have been taken include but are not limited to Corca Laidhe, Ireland yDNA, Iberian Peninsula, R-DF21 and Subclades, L21 Plus and those pertinent to the following surnames or variants thereof: Banks, Beatty, Callahan, Campbell, Chisholm, Crabbe, Dempsey, Denny, Dimond, Dugan, Eubank(s), Gray, Griffith, Haney, Johnson, Kell(e)y, Kennedy, Lyons, Martin, McAlister, McLaughlin, McLellan, Munster Irish, Murrell, Newman, Ogan, O'Higgins, O'Mahony, O'Mara, O'Shea, Peck, Perry, Porter, Reeve Ryan Soule Sullivan West
3. **The overall tree structure is based on the R-DF21 section of Alex Williamson's Y-tree (http://www.ytree.net/) and FTDNA's Haplotree, for which thanks are duly given. Not all SNPs / subclades in those sources are necessarily shown and responsibility for any errors arising from interpretation of data or failure to update the latest available information rests solely with the author of this tree. Haplotype data noted principally in the R-DF21 and Subclades Project's DNA Results spreadsheet has been used to give an idea of the probable ancestral haplotypes associated with the initial branches of these other DF21 subclades. These are speculative, particularly with respect to the levels in the hairarchies at which STR mutations occurred. Thanks here are due to the Administrators, past and present, and participants of the R-DF21 & Subclades Project.**
4. **The tree combines relationships based on STR testing with firm definition afforded by SNP testing. Where configurations are not confirmed by SNP testing, different permutations are possible. The reliability can only be improved by more participants testing STRs to 111 or 125 markers and Next Generation Sequence (NGS) testing such as FGC's Elite 2.1 and FTDNA's Big Y-700, identifying SNPs which give firm definition to the branches and twigs (subclades) of the tree.**
5. **The 'pseudonymised' format of FTDNA kit no. plus Most Distant Known Paternal Ancestor (MDKA) surname (or where the latter is not available the tester's surname or simply the kit no.) has been used for tester identity where the participant or his kit manager**

   (a) has opted in to allowing publication of his "pseudonymized DNA results and ancestor information in the public results pages" (and for data taken from other projects, where the project has allowed to publicly display its FTDNA Y-DNA Results spreadsheet)" OR

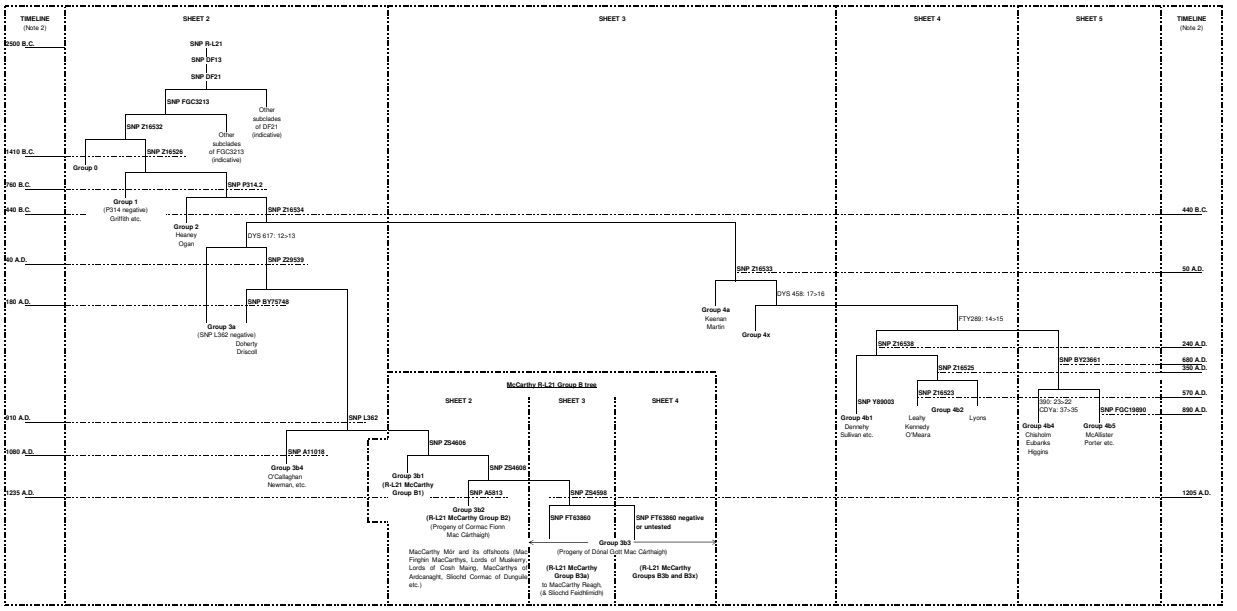
   (b) has e-mailed Nigel McCarthy permission to display the output from the analysis of data from any source in the tree (see (6) and (7) below) OR

   (c) has made results available to others (e.g. depositions in the 'Y-DNA Warehouse') in the knowledge their analyses, identifiable with surname and / or kit number, would be placed in the public domain.

   Otherwise identities of testers will be 'totally anonymised' with an 'XB' series 'dummy' reference number known only to the R Z16526 and Subclades Project Administrators.

   - **Status of a participant's FTDNA privacy setting has been determined in a one-off exercise in or since 2018 (or for recent additions at the time a kit has been added to the tree). Should a participant / kit manager wish the tree respect a subsequent alteration to the setting or indeed have a kit removed altogether and any back-up records held by the R Z16526 and Subclades Project Administrators, will he / she please request this by e-mail. (See (7)).**
6. **Despite the option at 5 (a) having been selected in a participant's FTDNA Project Preferences, certain data to which the R Z16526 and Subclades Project Administrators may have access, e.g. FTDNA Panels 6 and 7 STRs extracted from Big Y testing, results of testing elsewhere, may not be available, or readily available, in the public domain. Inclusion of output from analysis of such data on the tree requires e-mailed authorisation using an appropriate form of words which can be supplied to the participant or his kit manager. See (7) for contact details.**
7. **For the identity and contact details of the R Z16526 and Subclades Project Administrators please go to** https://www.familytreedna.com/groups/r-z16526-and-subclades/about.

LAYOUT OF THIS DOCUMENT BY MAJOR SUBCLADES WITH TIMELINE AND GROUPING LABELS FOR THE PROJECTS SERVED (For Group demarcations see website referenced in the title block)

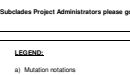


LEGEND:

a) Mutation notations

SNPs and InDels are denoted in bold type face. STR markers are denoted in light type face. The 'DYS' of DYS-prefixed STR markers is omitted; prefixes for all others are shown with a more detailed notation (e.g. DYF395S1a, DYR33, YCAIIb, (Y-)GGAAT 1B07, FTY371).

b) Participant kit number and testing details:



No. of STR markers examined (e.g. Y-DNA37, 67 or 111 at FTDNA);
125: All STRs of FTDNA' s Y-DNA111 test plus additional 14 markers comprising YSeq's 'FTDNA111 to YSeq116' panel. (14' indicates latter panel only tested);
575 (-n): As 125 + up to 450 STRs extracted from Big Y (FTDNA's Panel 6); n = no. of no-calls.
561 (-n): Y-DNA111 + up to 450 STRs extracted from Big Y (FTDNA's Panel 6); n = no. of no-calls.
517 (-n): Y-DNA67 + up to 450 STRs extracted from Big Y (FTDNA's Panel 6); n = no. of no-calls.
487 (-n): Y-DNA37 + up to 450 STRs extracted from Big Y (FTDNA's Panel 6); n = no. of no-calls.
The number of markers examined is increased by 277 (e.g. from 561 to 838) where FTDNA has included a Panel 7 (P7) extraction of data from a Big Y test. In this case n = total number of no calls at the 727 loci of the extraction. Where this is subsequent to an earlier extraction, information on no calls may be shown for both.
Has taken the original BigY or later Big Y-500 test, and / or
BY-700 = has taken a Big Y-700 test (whether or not an earlier Big Y test was taken)
YE = has taken a Y Elite test with FGC
PNL = has taken a FTDNA R1b SNP Pack Test or YSeq R1b Panel Test
NG = has taken a Nat Geographic Geno 2.0 or later test contributing to the analysis.
Grey shading indicates that results are not yet available or have not yet been reviewed.
Light grey shading indicates preliminary review only of results undertaken.
'Surname in parenthesis if no 'distant paternal ancestor' surname identified.
"Pseudonymised' or totally anonymised tester identity (see 'Important Notices', items 5 and 6).

c) (Not used)

d) STR Mutation highlighting (frequencies revised February 2020 in accordance with Fig 4a at https://mccarthydna.wordpress.com/):

"Very slow moving" STR markers (very low mutation rates) or rare multi-step mutation
"Slow moving" STR markers (low mutation rates)
Postulated STR back-mutation

} Not generally applied to P6 or P7 (see (d) below).

e) Guide dates

'Guide' dates on sheets 2-5 have the same meaning as those described under Note 2 for the Key Diagram on this sheet 1.

f) Other

> is used to denote a change in status (no. of repeating motifs) at an STR locus, e.g 576: 18>17 indicates a mutation from 18 to 17 at DYS 576. Elsewhere (in dates) it is used to indicate "later than".

P4 STR marker in FTDNA Panel 4 (38th - 67th markers in FTDNA sequence)
P5 STR marker in FTDNA Panel 5 (68th - 111th markers in FTDNA sequence)
P6 STR marker in FTDNA Panel 6 (112th - 561st markers in FTDNA sequence, extracted from Big Y data);
P7 STR marker in FTDNA Panel 7 (562nd - 838th markers in FTDNA sequence, extracted from Big Y data);
YSeq116 STR marker in Yseq's 'FTDNA111 to YSeq116' panel

A(A)(NNN)(NN)+/- Results of individual SNP testing (positive / negative), or extracted from a Next Generation Sequencing (NGS) test such as Big Y or Y Elite 2.1, or a Pack or Panel Test, where of particular relevance to kits close by on the tree.

PHYLOGENETIC TREE FOR HAPLOTYPES IN THE LINEAGES UNDER SNP R-Z16526

To be read in conjuction with analysis on the Results page of the R Z16526 and Subclades Project

(Ref: https://www.familytreedna.com/groups/r-z16526-and-subclades/results)

Sheet 1 of 5

N D McCarthy **Last updated: 28 September 2021**

SNPs R-L21 and R-L459

SNP R-FGC3218 / S552

SNPs R-DF13 and R-CTS8221 / Z2542

PHYLOGENETIC TREE FOR HAPLOTYPES IN THE LINEAGES UNDER SNP R-Z16526

For Revision date, Legend, Notes and other information, see sheet 1

STRs Estimated ancestral haplotype for R-DF13 (showing provisional assumptions where values are uncertain)

FTDNA Panel 1

393	390	19 /	391	385a	385b	426	388	439	389-1	392	389-2
13	24	14	11	11	14	12	12	12	13	13	29

FTDNA Panel 2

458	459a	459b	455	454	447	437	448	449	464a	464b	464c	464d
17	9	10	11	11	25	15	19	29	15	15	17	17

FTDNA Panel 3

	460	GATA	YCA	YCA	456	607	576	570	CDYa	CDYb	442	438
	11	11	19	23	16	15	18	17	36/37	38	12	12
Value assumed:									36			

FTDNA Panel 4

531	578	DYF	DYF	590	537	641	472	DYF	511	425	413a	413b	557	594	436	490	534	450	444	481	520	446	617	568	487	572	640	492	565
11	9	15	16	8	10	10	8	10	10	12	23	23	16	10	12	12	15	8	12	22	20	13	12	11	13	11	11	12	12

FTDNA Panel 5

	710	485	632	495	540	714	716	717	505	556	549	589	522	494	533	636	575	638	462	452	445	GATA	463	441	GGA	525	712	593	650	532	715	504	513	561	552	726	635	587	643	497	510	434	461	435
	35	15	9	16	12	25	26	19	12	11	13	12	11	9	12/13	12	10	11	11	30	12	13	24	13	10	10	20	15	19	13	24	17	12	15	24	12	23	18	10	14	17	9	12	11
Value assumed:															13																													

FTDNA Panel 6, extracted from Big Y-500 or Big Y-700 test data.

FTY 371	FTY 303	FTY 10	FTY 284	FTY 219	FTY 324	FTY 327	FTY 394	538	FTY 220	FTY 254	FTY 19	FTY 4	577	FTY 24	FTY 346	FTY 160	FTY 62	FTY 400	FTY 114	FTY 246	FTY 26	FTY 368	FTY 173	FTY 209	FTY 337	FTY 81	FTY 387	FTY 361	FTY 330	FTY 65	FTY 168	FTY 171	FTY 136	FTY 53	FTY 40	FTY 386	FTY 100	FTY 152	FTY 55	FTY 297	FTY 370	FTY 103	FTY 64	FTY 174	FTY 313	FTY 362	FTY 342	FTY 161	FTY 374	FTY 316	FTY 101	FTY 204	477	FTY 192	502	FTY 341	493	FTY 1	FTY 227	499	FTY 391	FTY 353	FTY 332	FTY 163	483	FTY 172	FTY 180	581	FTY 179	FTY 188	FTY 369	FTY 70	FTY 63	508	FTY 347	FTY 83	FTY 277	FTY 276	FTY 195	FTY 109	FTY 356	FTY 215	FTY 105	FTY 123	FTY 242	FTY 214	FTY 132	FTY 262	FTY 333	FTY 208	DYF 398B	FTY 43	FTY 166	FTY 13	FTY 11	584	608	FTY 95	FTY 151	FTY 388	FTY 256	580	FTY 234	FTY 268	FTY 139	FTY 27	FTY 75	512	FTY 329	FTY 320	FTY 7	FTY 247	FTY 211	474	FTY 39	FTY 376	FTY 37	FTY 373	475
5	4	4	4	7	5	4	11	11	4	4	5	4	9	4	4	6	6	4	4	5	4	5	5	5	5	4	5	6	5	7	4	5	4	4	5	6	4	4	6	5	4	4	4	6	10	4	4	8	6	5	4	5	8	5	8	5	10	7	7	8	7	5	5	5	12	4	4	8	5	5	7	11	5	11	5	5	5	5	7	6	6	6	7	5	6	13	4	5	4	4	5	5	5	5	5	8	9	6	5	6	6	9	5	4	4	5	5	11	5	5	5	4	5	8	4	4	4	4	8

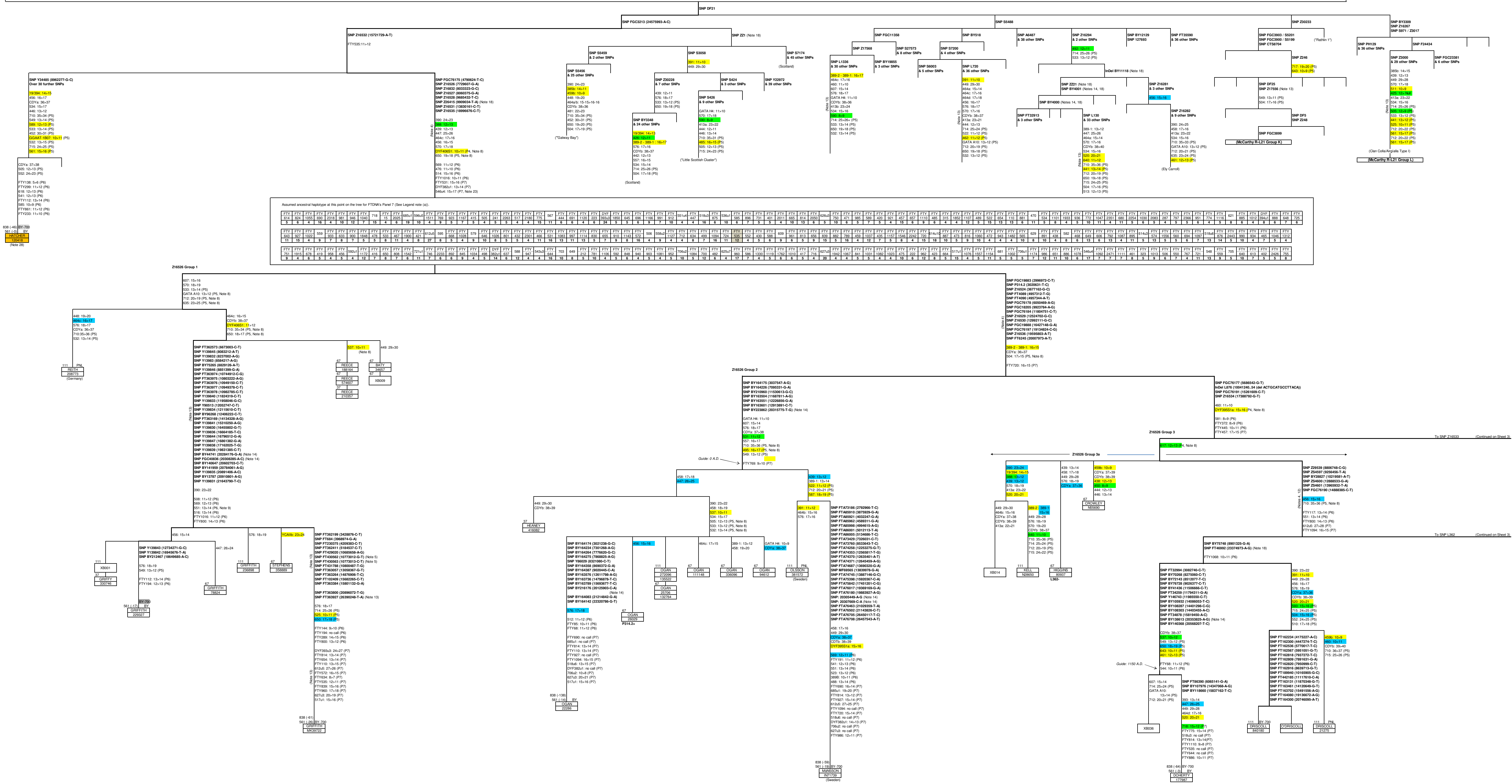
FTY 138	FTY 288	FTY 264	FTY 93	FTY 380	FTY 18	FTY 115	569	FTY 390	FTY 46	FTY 243	FTY 322	FTY 281	FTY 153	FTY 181	FTY 184	FTY 359	FTY 121	FTY 74	FTY 279	530	FTY 45	573	542	FTY 36	FTY 304	FTY 203	FTY 291	FTY 142	FTY 191	FTY 183	FTY 141	FTY 299	FTY 193	FTY 124	FTY 16	FTY 236	FTY 185	FTY 378	FTY 225	FTY 397	FTY 3	FTY 67	FTY 182	FTY 334	623	FTY 348	FTY 357	FTY 275	FTY 306	FTY 383	FTY 253	FTY 285	645	FTY 17	FTY 85	598	FTY 375	FTY 325	FTY 12	FTY 365	FTY 35	FTY 237	FTY 238	FTY 305	FTY 56	FTY 129	FTY 352	FTY 292	FTY 154	539	FTY 301	FTY 366	FTY 231	618	FTY 216	FTY 82	FTY 393	FTY 155	FTY 68	FTY 32	FTY 265	FTY 300	FTY 143	FTY 201	FTY 199	FTY 86	FTY 98	FTY 144	541	507	FTY 20	FTY 116	FTY 308	FTY 177	FTY 89	FTY 158	FTY 22	FTY 84	FTY 186	FTY 396	FTY 91	FTY 29	FTY 78	FTY 229	FTY 260	FTY 250	FTY 364	476	FTY 221	FTY 57	FTY 377	FTY 384	466	FTY 363	FTY 137	FTY 69	FTY 72	FTY 251	FTY 2
5	6	6	4	4	4	5	11	4	6	6	6	4	4	4	4	5	6	6	4	9	4	10	12	4	4	5	8	6	11	6	5	11	5	6	6	5	8	4	4	4	6	4	4	5	11	7	5	11	5	5	4	12	8	6	10	7	5	4	4	5	5	8	4	6	7	10	4	6	4	10	11	4	5	12	7	4	5	6	11	6	8	5	4	8	5	5	5	9	12	10	6	6	6	8	4	6	4	7	4	7	5	8	5	6	5	7	4	11	5	6	4	5	7	4	4	4	7	5	4

FTY 217	FTY 257	FTY 120	FTY 25	FTY 252	FTY 33	FTY 42	FTY 54	FTY 372	480	FTY 176	FTY 76	FTY 66	FTY 197	FTY 385	FTY 270	FTY 298	FTY 198	FTY 117	544	FTY 159	FTY 232	FTY 156	FTY 343	FTY 296	FTY 311	FTY 344	FTY 178	FTY 367	FTY 73	FTY 112	FTY 295	616	FTY 338	FTY 196	FTY 157	FTY 162	551	FTY 148	FTY 94	FTY 52	FTY 131	FTY 9	FTY 194	FTY 8	FTY 318	FTY 317	FTY 99	FTY 289	FTY 169	FTY 51	FTY 345	FTY 398	FTY 111	FTY 273	FTY 382	FTY 47	FTY 30	FTY 147	615	FTY 302	FTY 354	FTY 326	FTY 88	FTY 248	FTY 267	FTY 170	FTY 60	453	FTY 249	FTY 167	624	FTY 134	FTY 235	FTY 145	FTY 14	FTY 80	FTY 50	514	FTY 340	585	516	FTY 293	FTY 207	FTY 278	FTY 210	523	FTY 269	FTY 530	FTY 1156	FTY 1070	FTY 906	FTY 1004	FTY 331	FTY 31	FTY 226	FTY 335	583	FTY 339	FTY 113	FTY 280	FTY 255	FTY 59	620	FTY 349	FTY 130	FTY 119	DYF 398A	FTY 58	FTY 127	FTY 321	FTY 92	FTY 392	DYF 392	FTY 290	FTY 312	FTY 135	FTY 150	FTY 294	FTY 244
7	6	5	6	9	5	5	6	8	8	6	6	6	4	4	6	4	10	13	10	6	6	4	6	5	5	5	4	4	5	13	5	14	4	5	8	6	13/14	10	7	5	5	6	12	4	6	7	6	14	4	5	6	5	5	6	5	5	5	5	8	10	5	4	4	9	11	7	4	11	4	5	9	10	9	11	10	5	4	15	5	10	13	5	4	7	7	13	11	10	4	10	5	4	6	5	4	4	8	4	6	4	7	5	8	5	4	8	14	11	4	7	5	8	8	4	7	5	9	5	6
																																		Value assumed:			13																																																																																								

FTY 48	FTY 282	489	FTY 272	FTY 239	FTY 258	FTY 49	574	FTY 41	FTY 905	FTY 1103	FTY 502	FTY 743	FTY 443	FTY 670	FTY 883	631	FTY 1042	FTY 510	389B	FTY 512	FTY 837	642	FTY 407	FTY 935	FTY 563	FTY 1016	FTY 1091	FTY 1049	FTY 1155	602	FTY 587	FTY 635	FTY 904	543	FTY 1148	FTY 861	FTY 742	FTY 433	FTY 1039	FTY 71	FTY 259	FTY 108	FTY 336	FTY 44	FTY 233	FTY 274	FTY 34	FTY 942	FTY 1068	FTY 945	FTY 1051	FTY 658	FTY 625	FTY 800	FTY 818	FTY 971	FTY 509	FTY 1025	FTY 835	FTY 984	637	FTY 832	FTY 689	FTY 998	FTY 520	FTY 445	FTY 809	FTY 428	FTY 562	FTY 897	FTY 1064	FTY 1088	FTY 1052	DYF 405	FTY 310	FTY 189	488	FTY 283	FTY 28	FTY 578	484	FTY 858	FTY 596	FTY 915	FTY 446	FTY 452	FTY 1006	FTY 612	FTY 507
4	6	11	5	4	6	4	10	6	6	4	11	7	6	11	4	11	11	10	10	5	5	9	4	4	10	10	4	8	5	12	5	11	4	11	4	11	4	5	5	4	5	5	5	11	11	6	5	5	10	4	5	7	4	14	5	4	4	12	4	5	11	4	11	8	6	10	5	9	9	5	7	4	7	6	10	5	13	8	7	4	13	8	4	4	11	4	13	12	9

Yseq FTDNA111 to YSeq116 Panel (See sheet 3 for assumed alleles at the time of SNP ZS4608):

DYR 33	DYR 76	DYR 112	DYR 157	518	614	626	644	684	711	713	723	727	728



Assumed ancestral haplotype at this point on the tree for FTDNA's Panel 7 (See Legend note (a)).

FTY 614	FTY 824	FTY 1055	FTY 690	FTY 2318	FTY 981	FTY 946	FTY 1040	718	FTY 15	FTY 2025	685u1	596u5	FTY 1511	FTY 769	FTY 923	FTY 1167	FTY 415	FTY 505	FTY 241	FTY 2263	FTY 517	FTY 2180	FTY 775	567	FTY 444	FTY 691	FTY 1120	FTY 223	DYF 393u3	FTY 1850	FTY 645	FTY 696	FTY 1166	FTY 991	FTY 912	551u4	FTY 447	518u3	FTY 875	536u1	FTY 585	FTY 896	FTY 731	FTY 401	FTY 2011	FTY 665	FTY 814	FTY 2050	626u3	FTY 750	FTY 471	FTY 985	FTY 589	FTY 420	FTY 921	FTY 457	FTY 657	FTY 1110	FTY 485	FTY 315	FTY 1852	FTY 1107	FTY 489	FTY 522	FTY 654	FTY 110	FTY 881	470	FTY 534	FTY 1101	FTY 1933	FTY 936	FTY 772	FTY 1047	FTY 2351	FTY 680	FTY 2254	FTY 1030	FTY 2083	FTY 287	FTY 797	FTY 2366	FTY 951	FTY 774	FTY 1116	621	FTY 885	FTY 1012	DYF 394u1	FTY 888	FTY 648	FTY 725
5	6	4	16	4	10	12	7	15	4	6	19	10	4	9	5	7	5	4	5	5	4	4	15	11	6	6	4	6	24	5	5	6	9	7	10	4	4	16	6	10	6	7	5	5	4	10	13	6	5	10	6	5	7	5	4	15	6	9	6	4	4	12	5	15	13	13	6	11	5	8	4	5	10	11	4	11	5	6	5	4	5	5	6	4	5	8	6	4	8	6	7	6

FTY 643	FTY 927	FTY 1022	559	FTY 933	FTY 633	FTY 900	FTY 1848	FTY 478	FTY 533	FTY 467	FTY 1900	FTY 421	612u5	595	FTY 668	FTY 1028	579	FTY 646	FTY 1026	FTY 801	FTY 432	FTY 2301	FTY 466	FTY 531	FTY 1083	FTY 997	FTY 1114	FTY 830	FTY 655	FTY 910	FTY 1143	FTY 572	506	558u2	FTY 1127	FTY 712	FTY 634	FTY 499	FTY 1094	FTY 724	FTY 535	FTY 552	FTY 430	FTY 588	609	FTY 961	FTY 813	FTY 656	FTY 839	FTY 882	FTY 789	FTY 459	FTY 1037	FTY 435	FTY 1157	FTY 1546	FTY 2242	FTY 720	614u10	FTY 887	FTY 473	FTY 816	FTY 1060	FTY 472	FTY 943	FTY 1482	FTY 565	629	FTY 891	FTY 438	582	FTY 468	FTY 649	FTY 606	FTY 792	FTY 1087	FTY 895	614u3	FTY 574	FTY 1556	FTY 560	FTY 694	FTY 1097	518u6	FTY 876	FTY 2443	FTY 990	FTY 934	FTY 465	FTY 1046	FTY 1312
11	15	4	9	7	8	?	5	5	8	11	4	8	27	8	5	4	9	10	8	5	5	4	11	16	13	11	13	5	7	9	8	16	4	9	4	4	8	7	16	11	12	4	5	6	9	6	5	9	15	5	16	4	12	7	5	8	4	15	18	10	5	9	10	4	4	4	10	8	10	4	8	6	13	6	13	4	11	5	13	5	5	6	7	13	14	5	10	4	7	5	4

FTY 751	FTY 1915	FTY 678	FTY 419	FTY 958	FTY 456	592u1	FTY 1172	FTY 416	FTY 650	FTY 808	FTY 1542	721u1	FTY 746	FTY 2233	FTY 892	FTY 845	FTY 1034	FTY 498	DYF 382u1	FTY 637	588	FTY 947	543u3	FTY 644	703	649	FTY 212	FTY 781	FTY 1106	FTY 592	FTY 848	FTY 940	FTY 903	FTY 1081	FTY 952	706u2	FTY 1084	FTY 700	FTY 482	625u7	FTY 960	FTY 586	FTY 1330	FTY 1119	FTY 1762	FTY 1010	FTY 417	FTY 716	627u3	FTY 1942	FTY 1067	FTY 841	FTY 1031	FTY 1082	FTY 1023	FTY 475	FTY 222	FTY 962	FTY 423	FTY 664	517u1	FTY 1076	FTY 1557	FTY 1154	681	FTY 1002	706u1	FTY 1174	FTY 986	FTY 651	FTY 886	FTY 1078	546u4	FTY 1092	FTY 2471	FTY 1111	FTY 461	FTY 323	FTY 1013	FTY 506	FTY 550	FTY 767	FTY 721	548	FTY 559	705	FTY 640	FTY 613	FTY 402	FTY 2426	FTY 755
9	4	6	5	4	5	4	12	7	8	7	6	11	7	6	6	9	4	5	14	6	12	4	4	16	10	8	5	10	4	5	6	4	5	4	5	10	5	12	6	4	17	7	4	5	6	6	5	4	20	4	4	5	5	4	4	10	6	12	8	5	15	4	5	11	5	5	5	7	12	11	10	6	17	7	7	7	8	5	9	6	7	4	11	13	9	5	10	7	5	5	8

PHYLOGENETIC TREE FOR HAPLOTYPES IN THE LINEAGES UNDER SNP R-Z16526

Sheet 3 of 5

For Revision date, Legend, Notes and other information, see sheet 1

(Continued from Sheet 2)

From SNP Z16534 on Sheet 2

(Continued from Sheet 2)

From SNP Z29939 via a 24 to 25 mutation at DY5552 on Sheet 2

Munster branch 1 (Z16526 Group 3b)

SNP Z54596 (9203350-T-A)
SNP Z54604 (11855395-A-T)
InDel Z54607 (19993931-T-TC)
SNP Z54609 (20266134-T-A) (Note 14)
SNP Z29543 (20290846-A-C) (Notes 13, 14)
SNP FGCLR143 (22907825-T-C) (Note 18)
SNP Z29541 (25939381-C-G) (Note 16)

SNP L362 (3020591-A-T)
SNP Z54595 (7822719-G-T)
SNP FGC12098 (8778913-C-T)
SNP BY23794 (11588903-T-C)
SNP Z54599 (12841440-C-A)
SNP Z54602 (15191685-C-G)
SNP Z54603 (15844222-T-C)
SNP Z29540 (16791910-C-G)
SNP FGC79195 (16851959-G-A)
SNP Z29542 (19678121-G-A)
SNP Z54605 (19392772-T-C)
SNP Z54610 (20310317-G-A) (Note 14)
SNP BY28883 (20354790-T-C) (Note 14)
SNP Z54611 (21023131-C-A)
SNP Z54612 (21386935-G-A)
SNP Z54613 (21833565-C-A)

447: 26>25
513: 12>13 (P5, Note 8)
552: 24>25 (P5, Note 8)

FTY214: 13>14 (P6)
FTY285: 12>11 (P6)
FTY14: 10>9 (P6)
618u3: 16>17 (P7)
FTY656: 8>9 (P7)
FTY839: 15>14 (P7)

Caolachán of Cashel (d. ca. 954)

Z16526 Group 3b4

SNP A11018 (7952006-A-G)

CDYa: 37>36
710: 36>37 (P5, Note 8)

Cathach (d. 1045)

SNP Z54606 (19636028-C-T)

631: 11>12 (P6, Notes 8, 9, 13)
642: 9>10 (P6, Notes 8, 13)
740: 15>14 (P7, Notes 8, 13)

385: 13>14
447: 25>26
464c: 16>17
CDYa: 36>35
CDYb: 38>37

SNP: 24582946-A-G (Note 18)
SNP: 24596029-G-A (Note 18)

464: add one each of 15, 17

CDY: add one 37

SNP BY80822 (9920353-C-A)

CDYb: 38>37

YCA IIb: 23>22

439: 13>12
448: 19>20

557: 16>17 (P4, Note 8)

449: 29>30

464: deduct one 15
465: 15>14 (P5)

534: 15>16

459: add one 9
464: add one each of 15, 16

459b: 10>9
464: add one 14
CDYa: 36>35
CDYb: 38>37

448: 19>20
CDYb: 38>39

SNP Z30522 (2860407-C-T)
SNP BY81244 (6911303-C-T)
SNP FT179380 (8597489-G-G)
InDel: 12222124..28
(del TTTGA)
SNP BY123780 (10680442-A-G)
SNP BY123851 (10669916-C-G)
SNP BY145306 (21278988-A-G)

458: 17>18
464a: 15>14
413a: 23>22

456: 18>17
CDYb: 38>37

447: 26>25
464h: 16>17
CDYb: 38>37

447: 25>26
464h: 16>17
CDYb: 38>37

SNP BY69362 (8146255-T-G)
SNP BY69655 (8187675-G-A)
SNP BY69521 (12458888-C-G)
SNP BY105623 (13964690-C-T)
SNP BY106815 (14194202-C-T)
SNP BY110055 (14667462-A-G)
SNP BY111342 (14838575-C-G)
SNP BY124357 (16746803-C-G)
SNP BY145306 (21278988-A-G)

464: 13>12
CDYb: 38>37

447: 25>26
464c: 16>17
YCA IIb: 23>22
607: 15>14
CDYb: 38>39

FTY384: 11>12 (P6)
536: 11>12 (P6)
FTY191: 11>12 (P6)
FTY372: 9>10 (P6)
FTY112: 13>14 (P6)
FTY814: 13>14 (P7)
618u3: 16>17 (P7, Note 13)
FTY535: 12>13 (P7)

SNP FT212492 (3676018-G-A)
SNP FT214917 (5539316-T-C)
SNP FT215098 (5984099-A-G)
SNP FT216929 (9618266-C-T)
SNP: 11581046-G-A
SNP FT217556 (15860928-A-G)
SNP FT217411 (15965018-C-T)
SNP: 18166812-A-G
SNP FT218081 (19734962-T-C)

391: 11>10
458: 17>16
CDYb: 37>36
548: 13>14 (P5)
650: 18>17 (P5)

391: 12>11 (P5)
642: no call (P6)
464: 13>12 (P6)
FTY612: 12>13 (P6)
685u1: 19>20 (P7)
DY7350u3: 24>23 (P7)
FTY814: 13>12 (P7)
FTY927: 15>13 (P7)
618u2: 26>27 (P7, Note 13)
558u2: 9>10 (P7)
FTY960: 17>15 (P7)
FTY461: 8>7 (P7)

SNP BY59958 (6510515-C-A)
SNP BY67738 (11513500-C-T)
SNP BY102664 (13469774-T-C)
SNP BY103385 (14567159-A-G)
SNP BY116987 (15824650-G-A)
SNP Z42265 (16613563-G-T)
SNP: 20356759-T-A (Note 14)
SNP BY145897 (21835969-A-G)

464c: 16>15
576: 18>20
444: 12>11
712: 20>21 (P5)
650: 18>17 (P5)

FTY289: 14>15 (P6)
548: 13>14 (P5)
523: 13>12 (P6)
DY7350u3: 24>25 (P7)
FTY1094: 15>14 (P7)
FTY720: no call (P7)
FTY676: 14>13 (P7)

570: 18>19
CDYa: 36>37
714: 25>24 (P5)
497: 14>15 (P5)

SCALLAGHAN 754113

111 BY-700 CALLAGHAN 282258

390: 23>22
460: 10>9
CDYb: 37>36

838 (-154) 561 (-17) BY CALLAHAN N104485

838 (-90) 561 (-3) BY CALLAHAN N133144

838 (-14) 561 (-9) BY CALLAHAN 248120

37 O'SHEA 98349

838 (-67) 561 (-23) BY-700 PHL O'SHEA 229053

37 O'SHEA 149951

P314.2+, L362+

to McCARTHY R-L21 GROUP B

Now maintained as a separate tree

at https://mccarthydna.wordpress.com/

Z16526 Group 4a

464c: 15>16
576: 18>19
CDYb: 38>37
714: 25>24 (P5, Note 8)
452: 30>29 (P5, Note 8)
532: 13>12 (P5, Note 8)
635: 23>24 (P5, Note 8)

SNP FT74654 (4023955-G-T)
SNP FT74671 (4091533-T-G)
SNP FGC80190 (5033563-C-T)
SNP Y86306 (8034433-C-T)
SNP FT85400 (10764830-G-A)
SNP Y90445 (12027713-T-C)
SNP Y130182 (13620760-G-T)
SNP Y101563 (15690541-T-C)
SNP Y140784 (17340930-G-A)
SNP Y105154 (18841336-A-G)
SNP BY141454 (20730277-G-A)
SNP Y110564 (20919000-C-T)

390: 23>22
576: 19>20
714: 24>25 (P5, Note 8)

FTY275: 11>12 (P6)
685u1: 19>18 (P7, Notes 8, 13)
FTY112: 13>14 (P6)

439: 13>12
449: 29>28
548: 13>12 (P5, Note 8)
CDYb: 38>37
712: 20>19 (P5, Note 8)

464c: 16>15

447: 26>25

544: 10>9 (P6)
616: 14>13 (P6, Note 21)
FTY110: no call (P7)
FTY1083: 13>14 (P7)
627u2b: 20>19 (P7)

838 (-35) 561 (-1) BY-700 MARTIN 16473

SNP BY197170 (9908197-C-A)
SNP BY197561 (16284178-A-C)

576: 20>21

576: 18>17
CDYa: 37>36
CDYb: 37>36
635: 24>25 (P5)

SNP FT74734 (4195146-G-C)
SNP FT75276 (5083064-G-A)
SNP FT75626 (8793996-A-C)
SNP FT85401 (10800300-C-A) (Note 13)
SNP FT76178 (11967979-G-A)
SNP FT76907 (16254271-G-T)

447: 26>25

FTY112: 14>15 (P6, Note 8)
FTY612: 12>11 (P6)
FTY110: 13>12 (P7, Notes 8, 13)

Guide: 1440 A.D.

460: 11>12
557: 16>15

SNP: 9015703-G-A
SNP: 10779942-A-G
SNP: 17255898-A-G
SNP: 21113564-G-T

464d: 17>16
635: 24>25 (P5)
481: 10>13 (P5)

541: 12>11 (P6)
FTY269: 11>10 (P6)
488: 11>12 (P6, Note 13)
685u1: no call (P7)
FTY927: 15>13 (P7)

838 (-73) 561 (-29) BY-700 KEENAN IN74186

838 (-61) 561 (-29) BY-700 KEENAN 55306

838 (-67) 561 (-29) BY-700 KEENAN IN65265

838 (-90) 561 (-29) BY-700 KEENAN IN65864

SNP FF129 / Z3533 (5180379-A-G)
SNP FF6569 (11685756-G-T)

710: 36>35 (P5)
650: 18>21 (P5)
504: 15>17 (P5)
552: 24>25 (P5)

FTY112: no call (P6)
FTY110: no call (P7)
FTY961: 6>5 (P7)
627u2: 20>19 (P7)

SNP FT74766 (4203928-G-A)
SNP FT77251 (20409840-C-A)

551: 13>14 (P6)
494: 13>12 (P6)
FTY485: 11>12 (P7)
FTY572: 10>10 (P7)

SNP FT203427 (5000926-C-G)
SNP FT203966 (7907511-G-C)
SNP FGC58695 (9003947-A-G)
SNP FT204042 (12758268-G-A)
SNP FT204609 (13223916-G-A)
SNP FT204794 (14218026-G-A)
SNP FT205768 (21251159-A-G)

576: 21>22

551: 13>14 (P6)
523: 13>14 (P6)
DY3788A: 14>15 (P6)
FTY814: 13>11 (P7)
FTY966: 12>11 (P7)

SNP FT345743 (8751235-T-C)
SNP FT345282 (10129900-G-A)

FTY145: 11>12 (Note 13)
FTY466: no call (P7)

458: 17>16
FTY145: 11>12 (P6, Note 13)

Z16526 Group 4x

(Continued on Sheet 4)

447: 26>24
464: 15>16 (Note 9)
CDYa: 37>36

439: 13>14
389-1: 13>14
449: 30>29
536: 16>17

447: 24>23
458: 16>17

464: 16>15

SNP FT74654 (4023955-G-T)
SNP FT74671 (4091533-T-G)
SNP FGC80190 (5033563-C-T)
SNP Y86306 (8034433-C-T)
SNP FT85400 (10764830-G-A)
SNP Y90445 (12027713-T-C)
SNP Y130182 (13620760-G-T)
SNP Y101563 (15690541-T-C)
SNP Y140784 (17340930-G-A)
SNP Y105154 (18841336-A-G)
SNP BY141454 (20730277-G-A)
SNP Y110564 (20919000-C-T)

576: 18>19
CDYa: 37>36

464: 15>16
CDYa: 37>36

111 KEENAN 241486
P314.2+

37 KEENAN 136054

37 DIAMOND 139654
P314.2+

37 XB018

464b: 10>9
464d: 17>16
464: 16>17
620: 20>19

391: 11>10

37 ??? 558933

464b: 10>11

37 SPAIN 500738

37 SHEA 237385

458: 16>15

37 TIERNEY 579144

389-2 - 389-1: 15>14
449: 29>30
464d: 17>16

439: 13>14
547: 26>25
464d: 17>18
CDYa: 37>36
CDYb: 36>35
447: 25>24 (P5, Note 8)
620: 20>19 (P5, Note 8)
447: 25>24 (P5, Note 8)

37 DEMPSEY 156495

37 DEMPSEY 268100 127681

550: 23>22
464: 15>16 (Note 9)

550: 10>11
DYF406S1: 11>12
511: 10>11
520: 20>21
740: 11>12

37 REILLY 112716
P314.2+
L362-

SNP BY161009 (6532363-A-G)
SNP BY53787 (9613534-C-G)
SNP BY161628 (10062937-G-C)
SNP BY88540 (11023423-C-T)
SNP BY161842 (12735009-G-T)
SNP BY161933 (13241116-T-A)
SNP BY161995 (13566805-T-C)
SNP BY162148 (14340795-G-A)
SNP BY162220 (14738268-C-T)
SNP BY162587 (15467955-T-C)
SNP BY162690 (16596327-A-G)
SNP BY162931 (19371802-G-T)
SNP BY163290 (21116527-C-T)

389: 15>14
460: 10>11
464: 15>16 (Note 9)
498: 12>13
534: 15>14
713: 34>33 (P5)
740: 13>12 (P5)
523: 11>12 (P5)
532: 13>12 (P5)

SNP BY75599 (4007402-C-A)
SNP BY161252 (7958224-G-A)
SNP FT445442 (11451519-A-G)
SNP FT94004 (13024857-G-A)
SNP FT94140 (20053137-T-C)
SNP BY163110 (20520875-T-G)

429: 19>18
464: 16>15
464c: 16>17
CDYa: 37>36
CDYb: 38>39
712: 20>21 (P5)

429: 19>18
442: 12>11

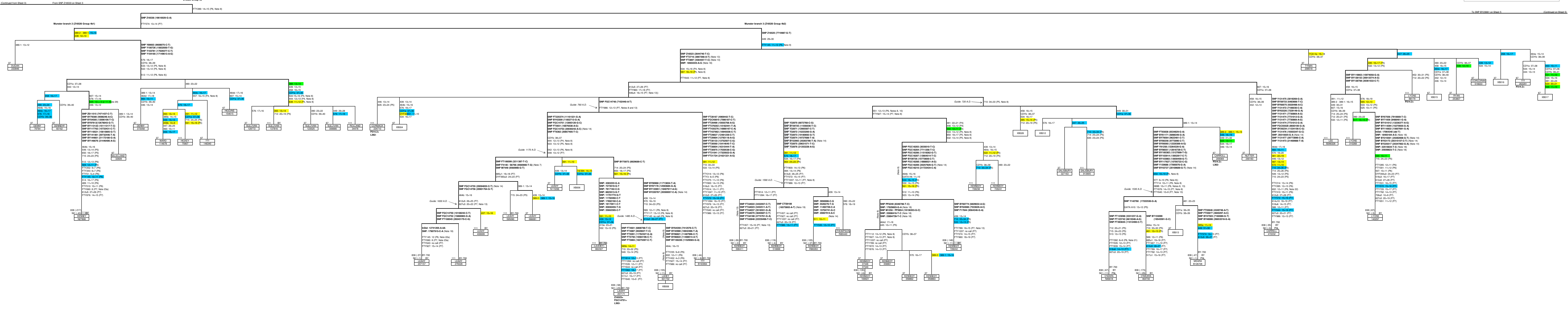
BW
BROWN
IN24027

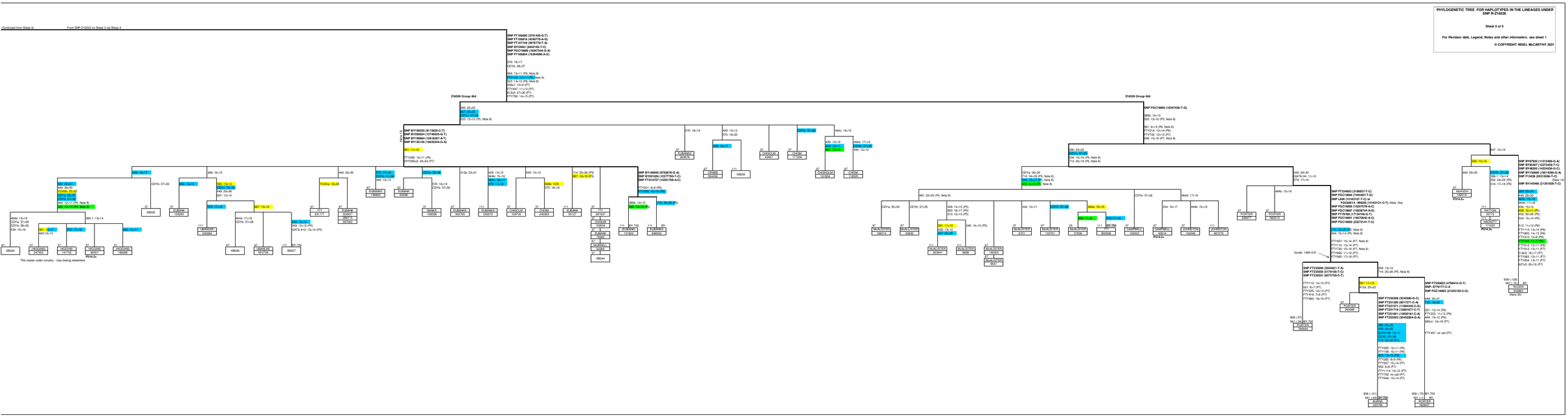
541: 12>13 (P6)
516: 14>15 (P6)
523: 13>14 (P6)
FTY485: 11>10 (P6)
685u1: 19>18 (P7, Note 13)
FTY927: 15>14 (P7)
612u5: 27>28 (P7)
614u10: 18>19 (P7)
FTY648: 13>12 (P7)
627u3: 20>21 (P7)

838 (-38) 561 (-1) BY-700 BY ENGLAIR 93055

PHYLOGENETIC TREE FOR HAPLOTYPES IN THE LINEAGES UNDER SNP R-Z16526

For Revision date, Legend, Notes and other information, see sheet 1




PHYLOGENETIC TREE FOR HAPLOTYPES IN THE LINEAGES UNDER SNP R-Z16526
Sheet 5 of 5
For Revision date, Legend, Notes and other information, see sheet 1
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(Continued from Sheet 4)
From SNP Z16533 on Sheet 3 via Sheet 4
Z16526 Group 4b4
Z16526 Group 4b5
SNP FT106680 (3701455-G-T)
SNP FT106816 (4340779-A-G)
SNP FT107146 (5676779-T-A)
SNP FT107147 (5676784-T-A)
SNP FGC19888 (19347344-G-A)
SNP FT108854 (19394986-A-G)
SNP BY190220 (8119825-C-T)
SNP BY200024 (13746835-G-T)
SNP BY189884 (15919397-A-T)
SNP BY183126 (19653044-G-A)
SNP BY190640 (8769679-G-A)
SNP BY201026 (13277793-T-C)
SNP FTA14727 (14301768-A-C)
SNP FGC19890 (19347426-T-G)
SNP FT234863 (3186037-T-C)
SNP FGC19884 (7404457-T-G)
SNP LB49 (15163127-T-C) or FGC26514 / BS026 (15163131-C-T)
SNP FGC19885 (15207576-A-C)
SNP FGC19887 (15393754-A-G)
SNP FT79788 (17134748-G-T)
SNP FGC19891 (19370402-A-C)
SNP FGC19889 (22272141-T-C)
SNP FT235090 (3534621-T-A)
SNP FT235505 (5175159-T-C)
SNP FT236321 (9273729-C-T)
SNP FT235088 (3245580-G-C)
SNP FT235390 (5017371-C-A)
SNP FT235371 (11984340-C-G)
SNP FT235719 (13891677-G-T)
SNP FT235981 (13982161-C-A)
SNP FT252583 (20452854-G-A)
SNP FT250823 (4798412-G-T)
SNP BT6177-C-A
SNP FGC19892 (21349126-C-G)
SNP BY87930 (11515499-G-A)
SNP BY95407 (12273439-T-C)
SNP BY140200 (14234539-G-C)
SNP BY130890 (19014590-G-A)
SNP P13438 (20310598-T-C)
SNP BY145466 (21301928-T-C)
Guide: 1490 A.D.
Note (3)
This cluster under scrutiny - may belong elsewhere
P314.2+
P314.2+
P314.2+
P314.2+
P314.2+