

Aetiology of Colla 9-0-9 Configuration

It is almost certain that the values of 9-0-9 for markers DYS 511, 425, 505 are stable and defining for the Colla population (with a couple of exceptions). In order to explore the variability of these markers, I

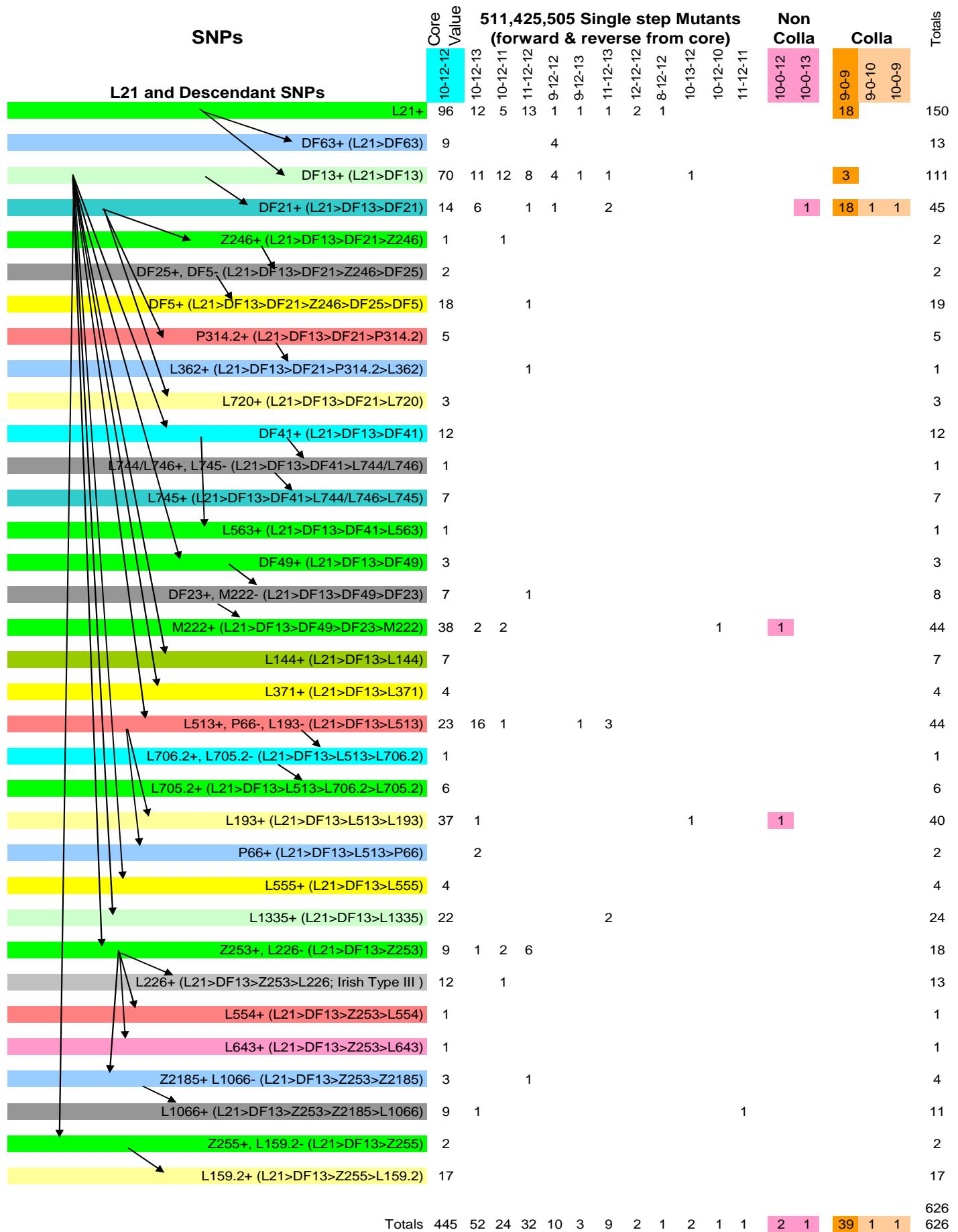


Table 1. Distribution of R-L21 by haplogroup and values for markers 511, 425, 505.

examined all R-L21 (from the L21 Project as at Dec 2012) that had tested to 111 markers. In all 626 testers qualified of whom 445 (71%) had values of 10-12-12 for these three markers (Table 1). I have termed these ‘core values’ on account of their frequency.

R-L21 tested to 111 markers

The testers in the R-L21 Project are ordered by the SNPs they have tested for; this layout is reproduced in Table 1. The distribution of ‘three marker’ configurations for each haplogroup is shown horizontally across Table 1. These variants (from the core values) are attributable to single (or more than one cumulatively) step mutation(s) occurring at meiosis. These have occurred in both forward and reverse directions from the core values for 511 and 505, mostly 11 and 9 for 511 and 13 and 11 for 505 (Table 2).

DYS 511			DYS 505		
	Repeats	No.		Repeats	No.
Core	10	524	Core	12	492
Var	11	42	Var	13	64
Var	9	13	Var	11	25
Var	12	2	Var	10	1
Var	8	1			
10% variability			15% variability		

Table 2. Number of variants from core values for DYS 511 and 505 among 582 Non-null Testers.

There are no values of nine repeats for 505 which is not surprising as the above distribution would predict that three sequential mutations would be extremely rare, probably so rare as not to survive to the present day. Nevertheless, such an event must have occurred to give 9-12-9 (or close to this) prior to the 425 null event. The remarkable stability of the 9-0-9 configuration might be attributable to the coincidental occurrence of the 425 deletion. Its present day high proportion in the L21 population is attributable to its early amplification due to high fecundity and low attrition, a situation which history suggests applied to the early Collas.

The Colla configuration of 9-0-9 is clear-cut and its most downstream haplogroup is DF21 (amber in Table 1), the assumption being that the earlier occurrences simply hadn’t tested for DF21. The two exceptions (light amber) are probably single step mutants from 9-0-9; less likely, is that one of them (but not both) could have been the Colla precursor. The evidence suggests that three additional null events (pink in Table 1) occurred in the L21 population (in addition to the Colla null).

There are five examples of null configurations other than 9-0-9 (Table 3). The first two can be accounted for by subsequent single step mutations in 511 and 505 respectively. The three remaining nulls occurred in haplogroups DF21, R-M222 and R-L193. As none of these null configurations show any significant relationships to each other (in McGee), it is probable that all five configurations arose independently.

Configuration	Haplogroup	ID	Name	nulls)	GD to DURRQ		Classification
					Key Marker Matches (excl	@ 67	
10-0-9	DF21	21971	McDougall	3	8	Single-step	Colla
9-0-10	DF21	156013	Glenon	2	11	Single-step	Colla
10-0-13	DF21	208397	McCloud	1	20	Independent Null	Non-Colla
10-0-12	M222	30771	Burns	0	23	Independent Null	Non-Colla
10-0-12	L193	144090	Little	0	22	Independent Null	Non-Colla

Table 3. Null configurations other than 9-0-9

A combination of a high number of key matches and low GD values (to DURRQ) distinguishes Colla nulls from the opposite which indicates non-Colla nulls (Table 3). Haplogroups can be a contributory identifier.

R-L21 tested to 67 markers

It was quickly realized that among the 111 testers who were non-Colla, there were no obvious Colla precursors; the closest any of them came to 9-0-9 was four steps away. Consequently, 67 marker non-Colla data was examined on the basis of the Colla key markers (385, 511, 413, 534) and GD to the DURRQ modal. The data was sorted by the number of key marker matches and by GD values (Table 4).

There were no incidences of four marker matches but four 3 marker and a large number of 2 and 1 marker matches were found; only those having 3, 2 and 1 matches are shown in Table 4. GDs ranged from 9 to 30. Where available, values for 505 and the number of steps needed to become 9-0-9, were filled-in.

		DYS	385	511	425	413	534	505	Key markers	Steps to 9-0-9
		DURRQ	GD	Modal	11-15	9	0	22-23	16	
McBroom	England	R1b1a2	12	158115	11-15	9	12	21-23	16	3
John Brinkley McBroom 1813 TN - 1898 OK	Unknown Origin	R1b1a2	12	171640	11-15	9	12	21-23	16	3
JOSHUA JONES b. 1748 Albemarle Co, VA, USA d. 183	Unknown Origin	R1b1a2a1a1b4	19	100192	11-15	10	12	22-23	16	3
William Allan, b. ?, m. 1760 Kilconquhar Fife	Scotland	R1b1a2a1a1b4	24	208171	11-15	9	12	20-23	16	3
Francis Corbitt,b.c.1790,Ballymena,Antrim,Ireland	Ireland	R1b1a2a1a1b4	9	134487	11-14	9	12	23-23	16	2
William Long, b 1740, d 1800 Penn	Ireland	R1b1a2a1a1b4	10	78252	11-15	9	12	23-23	16	2
William Broom b abt 1800>Daniel Broom, b.1822 S.C.	United States	R1b1a2	11	156866	11-15	9	12	21-23	15	2
Thomas BROOM d.1830 Beech Is.Twp.Edgefield Co.,SC	Unknown Origin	R1b1a2a1a1b4	12	14194	11-15	9	12	21-23	15	2
Wm.Broom b.1810-20 SC (1860 in Pickens Co.SC)	Unknown Origin	R1b1a2	12	47769	11-15	9	12	21-23	15	2
Angus Boyd, Argyllshire, Scotland	Scotland	R1b1a2a1a1b4	12	85278	11-15	10	12	23-23	16	2
Burrell Broom b.c.1740 Halifax Co. NC	England	R1b1a2	13	15536	11-15	9	12	21-23	15	2
Luke Broom b.1740+/-SC	Scotland	R1b1a2	13	34193	11-15	9	12	21-23	15	2
Cornelius Erwin, b. c. 1780 Ireland	Ireland	R1b1a2a1a1b4	13	42048	11-15	10	12	23-23	16	2
William Hendrix d1834Newberry SC m Rebecca Boozer	United States	R1b1a2	13	208546	11-15	9	12	21-23	15	2
James Alexander Gammie b. 1858	Scotland	R1b1a2	13	230380	11-14	9	12	23-23	16	2
JOHN WILLIAM BROOM, SLIDELL, LA.	Scotland	R1b1a2a1a1b4	13	N11946	11-15	9	12	21-23	15	2
Chas.Broom b.1784 FairfdCoSC >> Chas.Broom b.~1720	United Kingdom	R1b1a2a1a1b4	14	12311	11-15	9	12	23-23	15	2
Daniel Leahy,b abt 1810 Co Tipperary Ireland	Ireland	R1b1a2	14	50471	11-14	10	12	22-23	16	2
William Jackson MCBROOM (1842 MS - 1900 LA)	Scotland	R1b1a2	14	112070	11-15	9	12	21-23	15	2
John Broom b. 1763	United Kingdom	R1b1a2	14	154024	11-15	9	12	21-23	15	2
Edward Lunney, b. 1810 Co. Fermanagh; d. 1872 ON	Ireland	R1b1a2a1a1b4	14	159824	11-15	10	12	23-23	16	11
William Orton, 1808-1877	England	R1b1a2a1a1b4	14	193942	15-16	10	12	22-23	16	2
Solomon Broome b.c.1772 Halifax? Co., NC	England	R1b1a2	15	12380	11-15	9	12	21-23	15	2
Robert Christy, Derry Ireland, DOB 1700	Unknown Origin	R1b1a2a1a1b4	15	46135	11-15	10	12	22-23	15	2
Calvin Gross, born 1 Jan 1854 in North Carolina	Unknown Origin	R1b1a2a1a1b4	15	60726	11-15	10	12	23-23	16	2
Champagne Gibson 1746 VA-1820 Rockingham NC	Unknown Origin	R1b1a2a1a1b4	15	1524235	11-14	10	12	22-23	16	2
Jeremiah Bell 1806-1890, Monaghan, Ireland	Ireland	R1b1a2a1a1b4	15	B1215	11-14	10	12	23-23	16	2
William Burden, 1780-1855	England	R1b1a2a1a1b4	16	24467	11-15	9	12	23-23	15	2
Northern Ireland	Ireland	R1b1a2a1a1b4	16	65222	11-14	10	12	22-23	16	2
Samuel Gilbert b. 1788 Bucks Co., PA (Poss. Wils	Unknown Origin	R1b1a2a1a1b4	16	106326	11-15	10	12	23-23	16	2
Owen Lunney, abt 1820-1890, Co. Fermanagh, NI	Ireland	R1b1a2a1a1b4	16	159823	11-15	10	12	23-23	16	2
John Isaac McCormick	England	R1b1a2	16	167477	11-14	9	12	23-23	16	2
William Curren--born in Ireland (possibly Fermanag	Unknown Origin	R1b1a2a1a1b4	16	177709	11-15	10	12	23-23	16	2
Timothy OShea, Kerry	Northern Ireland	R1b1a2a1a1b4	16	N20887	11-14	10	12	22-23	16	2
David Owens, b 1831, Rutherford, NC	Ireland	R1b1a2a1a1b4	16	N44961	11-14	10	12	22-23	16	13
Joseph Williamson b 1817, Ashby de la Launde	Ireland	R1b1a2a1a1b4	17	89170	11-15	10	12	23-23	16	2
John McCaw, ca 1798 County Antrim	Unknown Origin	R1b1a2a1a1b4	17	94458	11-13	10	12	22-23	16	2
William Mears of Bertie Co, NC(?) USA, 1700s	United Kingdom	R1b1a2a1a1b4	17	158652	11-14	10	12	22-23	16	2
Black	Ireland	R1b1a2a1a1b4	18	77876	11-14	10	12	22-23	16	2
Bartley S Clancy, b 1797, SC d c 1857, Pike co AL	Unknown Origin	R1b1a2a1a1b4	18	85112	11-14	9	12	23-23	16	2
Francis Wisdom 1775 - 1835	England	R1b1a2a1a1b4	18	132684	11-13	10	12	22-23	16	2
Andritsopoulos adopted, Scots origin	Ireland	R1b1a2a1a1b4	18	135994	11-15	10	12	22-23	15	2
archibald mcdonald,b 1763 Scotland	England	R1b1a2a1a1b4	18	171106	11-15	10	12	22-23	15	2
Levi Mears 1820 NC	United Kingdom	R1b1a2a1a1b4	18	N32433	11-14	10	12	22-23	16	2
Unknown,but very likely from Wales late 1800s	Scotland	R1b1a2a1a1b4	19	12836	11-15	10	12	22-23	16	2
Unknown	England	R1b1a2a1a1b4	19	103935	11-14	9	12	23-23	16	2
John Campbell (???? – c. 1774 New Cumberland, VA/W	Wales	R1b1a2a1a1b4	19	168439	11-15	10	12	22-23	15	2
James Berry Roberts, b,1843, Alabama	United Kingdom	R1b1a2a1a1b4	19	N76898	11-15	9	12	23-23	15	12
James Boyd b ~1801 Ireland lived Gore QC Canada	Scotland	R1b1a2a1a1b4	20	14922	11-15	10	12	22-23	15	2
Hugh Heffernan, b. 1757, Ahoghill, Co. Antrim, IRE	Unknown Origin	R1b1a2a1a1b4	20	42106	12-14	10	12	22-23	16	2
Thomas Blowgatt 1490-1560 Haughley, Suffolk, ,	Unknown Origin	R1b1a2a1a1b4	20	50462	11-14	10	12	22-23	16	2
John McCroskey 1680-1757	Ireland	R1b1a2a1a1b4	20	84782	11-14	10	12	22-23	16	2
James H. McEwen, 1820-1861	Northern Ireland	R1b1a2a1a1b4	20	88489	11-15	10	12	23-23	16	2
Adrian Anglin, b. 1692	England	R1b1a2a1a1b4	20	176282	11-15	10	12	22-23	15	2
Juan Antonio Escalante, 1737, Arizpe, Sonora, Mexi	Scotland	R1b1a2a1a1b4	20	180800	11-15	10	12	23-23	16	2
Walter Sims, b. ca. 1760 GB d. 1820 TN, USA	Unknown Origin	R1b1a2a1a1b4	20	237385	11-14	9	12	22-23	15	2
William Duncan, b. 1824, Cumberland Cty. PA	Unknown Origin	R1b1a2a1a1b4	21	130411	10-14	10	12	22-23	16	2
Thomas Sherwood b.1586 d.1655 Nottinghamshire, Eng	Spain	R1b1a2a1a1b4	21	N10695	11-14	8	12	22-23	16	2
John Campbell (1800?) of Glasgow, Scotland, United	United Kingdom	R1b1a2a1a1b4	22	8042	11-14	9	12	20-23	16	2
James OConnor, 1790, Limerick - 1850	Scotland	R1b1a2a1a1b4	22	82157	12-14	9	12	22-23	15	2
Thomas Brazill 1753 Ballylongford KER >Abbeyleix	Unknown Origin	R1b1a2a1a1b4	22	136381	11-15	10	12	22-23	17	2
Thomas Babson d.1630 Somersetshire, England	Unknown Origin	R1b1a2a1a1b4	22	171447	11-15	10	12	22-23	15	2
John Rogers Sr., 16 Apr 1611, Warwick, England	Scotland	R1b1a2a1a1b4	23	39864	11-15	10	12	22-23	15	2
Michael Madden, bc1725. Lived: Rathbarry, Co. Cork	Ireland	R1b1a2a1a1b4	23	96442	11-16	10	12	22-23	16	13
Niel MacPherson b1713 d1795 Cawdor/Calder SCT	Ireland	R1b1a2a1a1b4	23	156833	11-14	10	12	22-23	16	2
Philip Murphy, b late 1700s, Beara, Cork, Ireland	England	R1b1a2a1a1b4	24	12652	11-15	10	12	22-23	18	2
Hiram Smith, b c1812 VT	United Kingdom	R1b1a2a1a1b4	24	131060	11-15	10	12	22-23	15	2
Samuel Henderson	Ireland	R1b1a2a1a1b4	24	37495	11-14	9	12	23-25	16	2
John Halliday, b. 1821, Dublin, Ireland	Ireland	R1b1a2a1a1b4	24	168525	11-13	10	12	22-23	15	1
Pierre Coitou St-Jean 1585 Nantes, Brittany	Scotland	R1b1a2a1a1b4	24	87585	11-14	10	12	22-23	15	1
Thomas Pelham, Barren County, KY	Ireland	R1b1a2a1a1b4	24	91505	11-15	10	12	23-23	15	1
George Franklin King, d. Missouri 1895	United Kingdom	R1b1a2a1a1b4	24	99851	11-14	10	12	22-23	15	1
Thomas B.Moore b. c. 1810 Beaver Co.,? PA	Scotland	R1b1a2a1a1b4	24	102517	11-15	10	12	23-23	18	1
Rev. Robert Huey, b. near Killea, IRL d. 1807 PA	Ireland	R1b1a2a1a1b4	24	113896	11-14	10	12	23-23	16	1
Johan Eriksson b. 1728 Ahlainen, Finland	France	R1b1a2a1a1b4	24	82681	10-14	10	12	23-23	16	1
?Griffeth bc1567Stepney-London;son Joshua	Unknown Origin	R1b1a2a1a1b4	24	84443	12-15	10	12	23-23	16	1
Conchobar Ua Donnchadh, Glenflesk, d1178	Unknown Origin	R1b1a2a1a1b4	24	96000	11-14	10	12	23-25	16	1
	Germany	R1b1a2a1a1b4	24	102379	11-16	10	12	22-23	15	1
	Unknown Origin	R1b1a2a1a1b4	24	131835	10-14	10	12	23-23	16	1
	Ireland	R1b1a2a1a1b4	24	132318	11-15	10	12	23-23	14	1
	Finland	R1b1a2a1a1b4	24	161355	11-14	10	12	23-23	16	1
	United Kingdom	R1b1a2a1a1b4	24	182210	11-14	10	12	23-23	16	1
	Ireland	R1b1a2a1a1b4	24	183411	11-15	10	12	23-23	15	1

Robert Mudie, 1510 - 1585	Scotland	R1b1a2a1a1b4	14	201989	11-14	10	12	23-23	16	1		
Mikkel Romundstad b1610-d1675,Rindal,Møre,Norway	Norway	R1b1a2a1a1b4	14	H1944	11-15	10	12	23-23	15	1		
George Kimball, Dixmont, Maine	England	R1b1a2a1a1b4	14	N23815	11-13	10	12	22-23	15	1		
Conchobar Ua Donnchadha Glenflesk, Killarney d1178	Ireland	R1b1a2a1a1b4	15	11211	11-15	10	12	23-23	15	1		
John d bef 12/12/1836 Beaver County PA m Mary	Scotland	R1b1a2a1a1b4	15	36308	11-15	10	12	22-23	15	1		
George W DeHart, born 8 April 1768, Ireland	Ireland	R1b1a2a1a1b4	15	47408	11-15	10	12	23-23	15	1		
William Anglin, d. 1803, Caswell Co., NC	Unknown Origin	R1b1a2a1a1b4	15	52030	11-11	10	12	23-23	16	1		
Thomas Delaney, 1842, Ireland	Ireland	R1b1a2a1a1b4	15	56363	11-15	10	12	23-23	15	1		
Joseph Hatton	Ireland	R1b1a2a1a1b4	15	58253	11-15	10	12	23-23	15	1		
William Churchman, b. c. 1750, Cambridgeshire, ENG	United Kingdom	R1b1a2a1a1b4	15	116944	11-14	10	12	24-24	16	1		
Michael Finn, b. c. 1810, Ireland	Ireland	R1b1a2a1a1b4	15	129421	11-15	10	12	23-23	15	1		
Thomas Jefferson Youngs (c1810-1873) KY	Unknown Origin	R1b1a2a1a1b4	15	133827	11-14	10	12	23-23	16	1		
Joseph Williams Prince Georges Co, MD early 1800's	United States	R1b1a2a1a1b4	15	138967	14-14	9	12	23-24	15	1		
John Healy, 1836 Massachusetts of Irish parents	Ireland	R1b1a2a1a1b4	15	166686	11-14	10	12	23-23	16	1		
Alexander Stuart, Augusta VA 1740-1822	Unknown Origin	R1b1a2a1a1b4	15	190435	10-14	10	12	22-23	15	1		
Timothy Collins, c 1758 - c 1821	Unknown Origin	R1b1a2a1a1b4	15	206354	11-14	9	12	23-23	15	1		
William D. Dunagan b. 1660 - 1689 d.? Limerick	Ireland	R1b1a2a1a1b4	15	229526	11-15	10	12	23-23	15	1		
Lewis Simmons, b. 1801, NC	England	R1b1a2a1a1b4	16	10505	11-15	10	12	23-23	14	1		
Pruner	Unknown Origin	R1b1a2a1a1b4	16	24520	11-14	10	12	21-23	16	1		
Hugh Warren, b. c. 1830, d. 1893	United Kingdom	R1b1a2a1a1b4	16	36951	11-15	10	12	23-23	15	1		
Richard Davis	United Kingdom	R1b1a2a1a1b4	16	58796	11-14	10	12	23-23	16	1		
William b 1764 d 1846 Lewis KY	Unknown Origin	R1b1a2a1a1b4	16	84808	11-16	10	12	22-23	15	1		
Christopher Hevey, b1838 or 48 Meath, Ireland	Ireland	R1b1a2a1a1b4	16	88229	11-14	10	12	23-23	16	1		
John Reed (c1696-1764)Netherwitton, Northumberland	England	R1b1a2a1a1b4	16	118639	11-12	10	12	22-23	17	1		
Charlie Connor 1914 -1975	Ireland	R1b1a2a1a1b4	16	145459	11-15	10	12	22-23	17	1		
Jerome Wilson b.1836, Gaila, Fair Isle SI	United Kingdom	R1b1a2a1a1b4	16	149620	11-14	10	12	22-23	15	13	1	6
Hendrik Janse Woertman, b.c. 1723, Menne	Germany	R1b1a2a1a1b4	16	179252	11-14	10	12	21-21	16	1		
Sutherland Ross, b. 1794 and d. 1870, Virginia	Unknown Origin	R1b1a2a1a1b4	16	221638	11-14	10	12	22-23	15	1		
Peter Cross , b. 1653	Unknown Origin	R1b1a2a1a1b4	16	N33346	11-13	10	12	23-23	16	1		
John Bawden, 1563 - 1638	United Kingdom	R1b1a2a1a1b4	16	N36716	11-14	10	12	23-23	16	1		
William Byers, b1738, Dumfriesshire, Scotland	Scotland	R1b1a2	16	N41928	11-15	10	12	23-23	15	1		
Jacob Eisenmann	Germany	R1b1a2a1a1b4	16	N42297	11-14	10	12	22-23	15	1		
Albert Patrick Cunningham, 1887 - 1976	Northern Ireland	R1b1a2a1a1b4	16	N78670	10-15	10	12	23-25	16	1		
Francis Rocks, Cladymore, County Armagh, 1817	Ireland	R1b1a2a1a1b4	17	21482	11-14	10	12	22-23	15	1		
Alexander McLay/McLean, b.c. 1655 m. 1674 Fife, Sc	Scotland	R1b1a2a1a1b4	17	28652	11-14	10	12	22-23	15	1		
William Bush, b.c. 1655 Engl d. 1739 Talbot Co. MD	Unknown Origin	R1b1a2a1a1b4	17	31903	11-14	9	12	20-23	15	1		
Robert Gordon, Scotland	Scotland	R1b1a2a1a1b4	17	40174	11-15	10	12	23-23	15	1		
participant is a Park	Unknown Origin	R1b1a2a1a1b4	17	40730	11-14	10	12	22-23	15	1		
Isaac Mason, 1753-1832	Unknown Origin	R1b1a2a1a1b4	17	49718	11-15	10	12	23-23	14	1		
Robert Taylor 1665, b.in Ireland, d. Aft. 1701, Va	Ireland	R1b1a2a1a1b4	17	58798	11-14	10	12	23-23	16	1		
John Cox, b.c. 1790, unknown - maybe Kentucky.	Unknown Origin	R1b1a2a1a1b4	17	85185	11-14	9	12	23-23	15	1		
Tobias Harp B. Circa 1760 S. C. Died 1845 Knox,	Unknown Origin	R1b1a2a1a1b4	17	95553	12-15	10	12	23-23	16	1		
Francis Diamond, Skreen, Co.Sligo, Ireland d c1830	Ireland	R1b1a2a1a1b4	17	147680	11-15	10	12	23-23	15	1		
Richard P. Johnston born 1799 Smythe County, Virgi	Scotland	R1b1a2a1a1b4	17	153269	11-14	10	12	22-23	15	1		
Mayer	Unknown Origin	R1b1a2a1a1b4	17	159185	11-14	10	12	22-23	15	1		
Alexander Matheson~1771-1845	Scotland	R1b1a2a1a1b4	17	167431	11-14	10	12	22-23	14	1		
George Horwill bef. 1665 - 1677, Devon,UK	England	R1b1a2a1a1b4	17	168477	11-14	9	12	23-23	15	1		
James Hall bc1760 Pennsylvania, USA d1836	Unknown Origin	R1b1a2a1a1b4	17	172600	11-14	10	12	22-23	15	13	1	6
William Roberts __?__(Mack is adopted last name),	Unknown Origin	R1b1a2a1a1b4	17	173850	11-15	10	12	23-23	15	1		
William Simons, ca. 1659 - 1738	England	R1b1a2a1a1b4	17	174521	12-15	9	12	23-23	15	1		
john eddy, circa 1680, circa 1751	Unknown Origin	R1b1a2a1a1b4	17	192172	11-14	10	12	21-23	16	1		
Thomas Conaway, 1798 - 1850	United Kingdom	R1b1a2a1a1b4	17	199254	11-14	10	12	23-24	16	1		
James Kirby 1815 Caherconlish, Limerick, Ireland	Ireland	R1b1a2a1a1b4	17	208185	11-15	10	12	23-23	15	1		
George McKay born about 1800	Ireland	R1b1a2a1a1b4	17	210015	11-14	10	12	22-23	15	1		
Garrett Dempsey, b. u/k and d. prior to 1871	Ireland	R1b1a2a1a1b4	17	232198	11-14	10	12	23-25	16	1		
Ole Engelson Øyjorden b1808 Fusa, Hordaland	Norway	R1b1a2a1a1b4	17	E2711	11-14	10	12	21-23	16	1		
Thomas Chambers, b. c1620, Mooresome, Yorkshire N	England	R1b1a2a1a1b4	17	N22147	11-14	10	12	22-23	15	13	1	6
James Jamison & Sarah Bumgardner, 1848, Kentucky	Unknown Origin	R1b1a2a1a1b4	17	N26096	11-14	10	12	22-23	15	1		
William Hall b1779 NBL UK d1843 Newcastle/T NBL	United Kingdom	R1b1a2a1a1b4	17	N36228	11-14	10	12	22-23	15	1		
Robert Cursiter, b.c. 1750 Orkney Islands, Scotlan	Scotland	R1b1a2a1a1b4	18	2132	11-11	10	12	23-23	16	1		
Thomas Kincaid, b. 1755, PA	Scotland	R1b1a2a1a1b4	18	16491	11-14	10	12	22-23	14	1		
John William McAulay, b.c. 1816 NC	Scotland	R1b1a2a1a1b4	18	41613	11-15	10	12	23-23	15	1		
John Willcockson (m.1742 to Sarah Boone in PA)	Unknown Origin	R1b1a2a1a1b4	18	54502	11-14	10	12	22-23	15	1		
Lawson Lyons, b. 1868, LA	Unknown Origin	R1b1a2a1a1b4	18	97313	11-13	9	12	20-23	14	1		
George Keyser,born 1575,LeightonBuzzard,England	England	R1b1a2a1a1b4	18	113986	11-15	10	12	23-23	15	1		
Gregor MacKinnon, born 1749, Skye, Scotland, died	Scotland	R1b1a2a1a1b4	18	117764	11-14	10	12	22-23	15	1		
Charles Hall bc1630 UK? d1695 Maryland USA	Unknown Origin	R1b1a2a1a1b4	18	124777	11-14	10	12	22-23	15	13	1	6
Michael Griffy, Shandrum, Clare Ire. m. 1841	Ireland	R1b1a2a1a1b4	18	128753	11-15	10	12	23-23	15	1		
Wallace McKenzie, 1919, Ninga, Manitoba, Canada	Unknown Origin	R1b1a2a1a1b4	18	137406	11-14	9	12	20-23	15	1		
Nathan Godwin b 1807 NC d Lowndes Co AL	Wales	R1b1a2a1a1b4	18	139021	11-14	9	12	23-23	17	12	1	4
Joseph Williams, b. 1660 Anne Arundel Co., MD	United Kingdom	R1b1a2a1a1b4	18	139697	11-14	9	12	23-24	15	1		
James McCan b. ca. 1800, d. ca. 1838	England	R1b1a2a1a1b4	18	147071	11-15	10	12	23-23	15	1		
Hans Christoff Imler13 Feb. 1653 -15 March, 1725	Unknown Origin	R1b1a2a1a1b4	18	147837	14-14	9	12	23-25	15	1		
Paterick Manion 1800	Unknown Origin	R1b1a2a1a1b4	18	148352	11-14	10	12	22-23	15	1		
Wm. Adams, jr. b. 1750 N. Carolina	Germany	R1b1a2a1a1b4	18	148632	11-15	10	12	23-23	15	1		
Martin MacDonald, ca 1755 Inverness, Scotland	Ireland	R1b1a2a1a1b4	18	158189	12-14	10	12	23-24	16	1		
Adam Doggart, b. 1785 and d. 1892	Unknown Origin	R1b1a2a1a1b4	18	166395	11-13	10	12	22-23	15	1		
Lucus Taylor, b. 1816 and d. abt 1887	Scotland	R1b1a2a1a1b4	18	167382	11-14	10	12	22-23	15	1		
Jonathan Moore, b. Aug 2, 1754, New York	Northern Ireland	R1b1a2a1a1b4	18	237552	11-14	10	12	22-23	15	13	1	6
William Francis Davey b.c. 1805 Co.Sligo, Ireland	Unknown Origin	R1b1a2a1a1b4	18	258447	11-14	10	12	23-23	16	1		
Patrick Graham (Grimes) b. c1795, VA	United Kingdom	R1b1a2a1a1b4	18	24555	11-14	10	12	22-23	15	1		
Rees Thomas, b. 1690 and d. 1759 Augusta co., VA	Ireland	R1b1a2a1a1b4	18	36948	11-15	10	12	23-24	14	1		
Allen Jeff Young, 1861-1913	Unknown Origin	R1b1a2a1a1b4	18	49608	11-14	10	12	23-23	16	1		
William Campbell (1773-1863) of Indiana County, PA	Wales	R1b1a2a1a1b4	18	N5410	14-14	9	12	23-23	14	1		
Elisha Lambert, maybe NJ, b. 1759	Unknown Origin	R1b1a2a1a1b4	18	N79717	11-15	10	12	23-23	14	1		
	Scotland	R1b1a2	19	4401	11-15	10	12	22-23	15	1		
	Unknown Origin	R1b1a2a1a1b4	19	31399	11-14	10	12	23-23	16	1		

William Bush, b. c. 1655, England; d. 1739, MD	England	R1b1a2a1a1b4	19	36886	11-14	9	12	20-23	15	1
Fred House 1900 - 1970	Unknown Origin	R1b1a2a1a1b4	19	48292	11-13	10	12	22-23	14	1
Nathan Arnett, b.c. 1760, Kent Co. Del.	Unknown Origin	R1b1a2a1a1b4	19	51353	11-14	10	12	22-23	14	1
Unknown	Unknown Origin	R1b1a2a1a1b4	19	53904	11-15	10	12	23-23	15	1
John Hamilton, b.c. 1634, Scotland	Scotland	R1b1a2a1a1b4	19	64670	11-14	10	12	22-23	15	1
Hugh Boyd, Patrick Cnty. VA USA late 1700's	Unknown Origin	R1b1a2a1a1b4	19	78805	11-14	10	12	22-23	14	1
Guillaume Hamon b: ca 1666, Mayenne, FR	France	R1b1a2a1a1b4	19	84034	11-16	9	12	23-23	15	13
john lawrie 1580 Fife scotland	Scotland	R1b1a2a1a1b4	19	93409	11-14	10	12	22-23	15	1
John Watkins b 1694-1763,. d. Halifax County	Unknown Origin	R1b1a2a1a1b4	19	102970	13-14	10	12	23-23	16	1
Alexander McMillan, b.1819, Carsphairn, Kirkcudbri	Scotland	R1b1a2a1a1b4	19	104203	11-14	10	12	22-23	15	1
Alexander MacGruar b.10/7/1706 Boleskine Scotland	Ireland	R1b1a2a1a1b4	19	114664	11-15	10	12	23-23	15	1
Patrick Feeney B1790-Maumeen,Gorumna Island Galway	Ireland	R1b1a2a1a1b4	19	124898	10-11	10	12	21-23	16	1
Leysmill, Angus, Scotland	United Kingdom	R1b1a2a1a1b4	19	125139	11-14	10	12	22-23	15	1
James McCarthy b c 1782 COR IRL	Ireland	R1b1a2a1a1b4	19	128856	11-15	8	12	23-23	15	1
John of Nuide>Donald 1614>William 1638>Blairgowrie	Scotland	R1b1a2a1a1b4	19	132463	11-14	10	12	22-23	15	1
Richard White, 1710 - 1757	England	R1b1a2a1a1b4	19	138906	12-15	10	12	23-23	16	1
Walter Matheson, 1770-1861	Scotland	R1b1a2a1a1b4	19	144926	11-14	10	12	22-23	14	1
John Gibbons 1780-1855, Louisburgh, Co Mayo	Ireland	R1b1a2a1a1b4	19	167144	11-14	9	12	23-23	15	1
Adam Cunningham b.1713 Ireland(of Scotland)	Ireland	R1b1a2a1a1b4	19	173987	11-14	10	12	22-23	15	1
John Sorley b. 1776 Fowlis Wester PerthshireScotla	Scotland	R1b1a2a1a1b4	19	174145	11-14	10	12	22-23	15	13
Henrik Magnusson Jukonen,1789-1842,Johannes,Finlan	Finland	R1b1a2a1a1b4	19	176545	11-14	10	12	23-24	16	1
Oluf Aase 1537-1601 Kvam, Hordaland	Norway	R1b1a2a1a1b4	19	200859	11-14	10	12	21-23	16	1
Michael Lynch, born 1820 County Clare	Ireland	R1b1a2a1a1b4	19	213449	11-15	10	12	23-23	15	1
Thomas Watson,c1690	Scotland	R1b1a2a1a1b4	19	E2651	11-14	10	12	22-23	15	1
William McKee, b.c. 1835, Pomeroy, Co. Tyrone, Ir	Ireland	R1b1a2a1a1b4	19	N2261	11-14	10	12	22-23	15	1
Christopher Lenares, born c. 1911, Spain	Spain	R1b1a2a1a1b4	19	N43805	11-14	10	12	23-23	16	1
Laban C. Marsh, b. abt 1790, Edgefield Co. SC	United Kingdom	R1b1a2a1a1b4	19	N61764	11-14	10	12	23-23	16	1
Austin Shipp Price, b. 26 Jun 1840, Johnson Co, IN	Ireland	R1b1a2a1a1b4	19	N65235	11-14	10	12	23-23	16	1
Andrew Lamont Young, b 1646 Dunoon, Scotland	United Kingdom	R1b1a2a1a1b4	20	9452	11-14	9	12	23-24	15	12
John Harvey, b. abt. 1615, Warwickshire, England	Scotland	R1b1a2a1a1b4	20	10429	11-14	10	12	22-23	15	1
Lachlan Macdonald, born abt 1740 North Uist	England	R1b1a2a1a1b4	20	21011	11-14	10	12	23-24	16	1
Donald McComas/McGregor, b.c. 1720 Brig o' Turk	Scotland	R1b1a2a1a1b4	20	26569	11-14	10	12	22-23	15	1
Neil Mathesonb1823LochAlshSCT>CAN Z2534+L643+ 111p	Scotland	R1b1a2a1a1b4	20	28296	11-14	10	12	22-23	15	1
James Moore, ca.1650-1694, b.UK, d.PA, USA; Scotti	Scotland	R1b1a2a1a1b4	20	57521	11-14	10	12	23-23	16	1
John Woods, b. c 1720, Ireland; d. 13 Nov 1813, NC	United Kingdom	R1b1a2a1a1b4	20	67708	11-14	10	12	21-23	16	1
Elijah Campbell (b.1833) Drumgoon, Cavan, Ireland	Ireland	R1b1a2a1a1b4	20	76375	11-14	10	12	22-23	11	1
John Phillips d:1801 Rowan Co. NC	Ireland	R1b1a2a1a1b4	20	82992	12-14	10	12	22-23	15	1
Thomas Griffin, b c1765 NC, d 1812 Tattnall Co, GA	Unknown Origin	R1b1a2a1a1b4	20	84729	11-13	9	12	21-24	15	1
James D Robinson III, 1935, Atlanta, GA	Unknown Origin	R1b1a2a1a1b4	20	96772	11-15	10	12	23-23	17	1
George Thomas Hamilton, (1844-1914)	Unknown Origin	R1b1a2a1a1b4	20	103494	11-14	10	12	23-23	16	1
James RODDY b 1784 Gamaliel, KY poss Cork ancest	Unknown Origin	R1b1a2a1a1b4	20	112391	11-14	10	12	22-23	14	1
Zedekiah Morgan, 1795-after 1860	Ireland	R1b1a2a1a1b4	20	140532	11-15	10	12	23-23	15	1
James Robertson b.1850, Ball Play, Cherokee Co, AL	Unknown Origin	R1b1a2a1a1b4	20	173316	11-14	9	12	23-23	18	1
Jeremie(?) Onfray, b. 1620 in Fresnes (Normandy)	Scotland	R1b1a2a1a1b4	20	193641	11-14	10	12	21-23	16	1
James Sutherland, b.1755c Unknown Scotland	France	R1b1a2a1a1b4	20	E15470	11-14	10	12	23-23	16	1
James Diver, b.c. 1824, Kilmacrennan, Donegal, Ire	Scotland	R1b1a2a1a1b4	20	N25121	11-15	10	12	22-23	15	1
Edward Baker c.1610-1687; d. Lynn, MA, USA	Ireland	R1b1a2a1a1b4	21	10800	10-14	10	12	22-23	17	1
James Guthrie c1720-1800, IRL/MD/NC (Elizabeth)	England	R1b1a2a1a1b4	21	12539	11-15	10	12	23-23	15	1
William Addison, unkn- 1811	Northern Ireland	R1b1a2a1a1b4	21	24607	11-14	9	12	23-23	14	12
David Enix, b.c. 1750, Albemarle Co. VA	Scotland	R1b1a2a1a1b4	21	42875	11-14	9	12	23-24	17	1
Michael Byrne, 1818 - 1871	United Kingdom	R1b1a2a1a1b4	21	85688	11-14	10	12	23-24	16	1
Walter Kelly, b.c.1730, Timahoe, Kildare, Ireland	Scotland	R1b1a2a1a1b4	21	102770	11-13	10	12	22-23	15	1
Stephen Harding b 1623 MA d 1698 RI	Ireland	R1b1a2a1a1b4	21	127795	11-16	10	12	22-23	16	1
Jeffrey Robertson, b. 1654, Scotland	Ireland	R1b1a2a1a1b4	21	129844	11-14	10	12	23-23	16	1
John Woods, b. c 1720, Ireland; d. 13 Nov 1813, NC	England	R1b1a2a1a1b4	21	132486	11-15	10	12	21-23	15	1
Edward Culver 1600-1685 Colonial MA and CT	Scotland	R1b1a2a1a1b4	21	134396	11-14	10	12	21-23	16	1
Pere ROMA, b. 1500, Borredà (Catalonia)	Ireland	R1b1a2a1a1b4	21	152967	11-14	10	12	22-23	11	1
George Brown, 1816 - 1892	United Kingdom	R1b1a2a1a1b4	21	205239	11-13	10	12	23-23	16	1
Richard Harvey b @ 1642 prob. Warwickshire, UK	Spain	R1b1a2a1a1b4	21	232541	11-14	9	12	20-23	15	1
Dougal Matheson, born Lochalsh, Wester Ross, Scot	England	R1b1a2a1a1b4	21	238460	11-14	10	12	22-23	15	1
Patrick Dalton born 1841 Ballyknockane, Kilcash	Scotland	R1b1a2a1a1b4	21	N18363	11-14	10	12	22-23	16	1
William White b. 1792, West Twp. Huntingdon County	United Kingdom	R1b1a2a1a1b4	21	N40691	11-14	10	12	23-24	16	1
John J Barrett 1908-1985 Proctor,MN. U.S.A.	Scotland	R1b1a2a1a1b4	21	N68552	12-14	10	12	22-23	15	1
William Harley 1830 - 1900	Ireland	R1b1a2a1a1b4	22	8211	11-14	10	12	23-23	16	1
John Anderson ca.1706 Scot/Ire -1787VA	Unknown Origin	R1b1a2a1a1b4	22	18569	11-15	10	12	23-23	15	1
William Center, bc. 1782, NC; d. 1839, SC	Unknown Origin	R1b1a2a1a1b4	22	28460	11-14	10	12	23-23	16	1
Benjamin W. Elliott b. c. 1812 NC d. c. 1865 AL	Unknown Origin	R1b1a2a1a1b4	22	35786	11-14	10	12	23-23	16	1
Jack Fields, b.1859, Tishomingo, MS	Unknown Origin	R1b1a2a1a1b4	22	43096	11-14	10	12	22-23	14	1
Alexander McLachlan b1790 St Ninians, Scot.	Ireland	R1b1a2a1a1b4	22	525460	12-14	10	12	22-23	19	1
John Etherington, 1763-1838	Scotland	R1b1a2a1a1b4	22	56732	11-16	9	12	23-23	15	13
Jean Bodin, 1645	Unknown Origin	R1b1a2a1a1b4	22	82080	11-14	10	12	22-23	11	1
Andrew Bryant, 1825-1864	Ireland	R1b1a2a1a1b4	22	100202	11-15	10	12	21-23	14	1
Lauchlan Rose, !5 Oct 1723, Cawdor, Nairnshire, Sc	Unknown Origin	R1b1a2a1a1b4	22	103139	11-13	10	12	23-23	14	1
Jared McDonald, 1740 - 1808	United Kingdom	R1b1a2a1a1b4	22	140003	11-13	9	12	23-23	15	1
Alexander Thomson, born 1819, Lesmahagow, Scotland	Scotland	R1b1a2a1a1b4	22	147767	11-14	10	12	22-23	15	1
James MacGregor alias Drummond b 1760 Comrie	England	R1b1a2a1a1b4	22	155793	11-14	10	12	22-23	15	1
Breen	France	R1b1a2a1a1b4	22	160587	11-13	9	12	23-23	14	1
Laverty	Unknown Origin	R1b1a2a1a1b4	22	169471	12-15	10	12	23-23	16	1
Joseph Griffith b. 1875 MO d.1904 KY	Scotland	R1b1a2a1a1b4	22	183786	11-14	10	12	22-24	16	1
Henry Ferguson, b.1807 and d. 1891	Scotland	R1b1a2a1a1b4	22	188279	11-15	10	12	23-23	15	1
Anders Nielsen of Vejle Amt, DK	Scotland	R1b1a2a1a1b4	22	189779	11-15	10	12	23-23	17	1
	Scotland	R1b1a2a1a1b4	22	213368	11-17	10	11	23-23	16	1
	Ireland	R1b1a2a1a1b4	22	251976	11-14	10	12	22-23	17	1
	Ireland	R1b1a2a1a1b4	22	254744	11-15	10	12	23-23	15	1
	Wales	R1b1a2	22	259187	11-14	9	12	23-23	14	1
	Canada	R1b1a2a1a1b4	22	B2715	11-14	10	12	23-23	16	1
	Denmark	R1b1a2a1a1b4	22	N29988	11-15	10	12	17-21	13	1

Lauritz Lasseson Heihiller b c1630 Fusa, Hordaland
 Gaetano C. Basil, b. 1845 Sicily - d.13 Jan. 1903
 James H. Mitchell b. c1810 TN, prob. Bedford Co.
 George McCracken, Born: abt 1725 Scotland moved to Charles P. Lewis (John LEWIS of Wales)
 Benjamin Jones, 1762 - 1844
 James Downie b. ca 1614 Fife Scotland
 Archibald or Alexander McLaren, c1785
 John Leonard Marth, b 1854, Baden, Germany
 Philippe Sebille 1570-1662 Quemper-Guezennec (Brit
 Edmund Dalton, b c1840, Newcastle, Co. Tipperary
 Edmund Moore, ?-1689
 William Denson (b.1620,Westminster;d.1676,VA)
 Archibald Harvey Johnston, Scotland to Ire 1700s
 William Adams Sr. b. abt. 1750 Mullavilly, Armagh
 Lemoine
 John Elliott, 1878-1947, born in County Donegal

 Benjamin McCullar, 1790 - 1863
 JohnCouncil POOL,bc.1825 NC s/o Samuel&Lucretia
 John Hight,c1757-1824,m.FranklinCo,NC,d.WilsonC,TN
 William Grannum b.c.1700 unkn, d.c.1750 Barbados
 George Stoney, b 1793, Yorkshire, England
 Thomas Cross Christmas, 1689-1769
 Daniel Martin born Galway, died 1847 Dublin, Irela
 charles raymond b. c.1850 Massachusetts
 y-DNA John Hoyt, James Hight,1835-98,CampbellCo.VA

 William C. Walker b ca 1836/37 d 1886
 Richard Sambell, c 19.07.1661 d. poss 18.08.1695
 Thomas Rogers, b 1740, Virgina
 unknown

Norway	R1b1a2a1a1b4	22	N36461	11-14	10	12	21-23	16	1
Italy	R1b1a2a1a1b4	23	11217	11-14	9	12	23-23	14	1
United Kingdom	R1b1a2a1a1b4	23	14517	11-14	10	12	22-23	15	1
Northern Ireland	R1b1a2a1a1b4	23	14749	11-14	10	12	23-23	16	1
Wales	R1b1a2a1a1b4	23	44100	11-15	10	12	23-23	15	1
Unknown Origin	R1b1a2a1a1b4	23	95968	11-14	9	12	23-23	15	1
Scotland	R1b1a2a1a1b4	23	186668	11-14	10	12	22-23	17	1
Scotland	R1b1a2a1a1b4	23	230581	11-14	10	12	22-23	15	1
Germany	R1b1a2a1a1b4	23	N66020	11-14	10	12	22-23	18	1
Unknown Origin	R1b1a2a1a1b4	23	N81310	11-14	9	12	23-25	15	1
Ireland	R1b1a2a1a1b4	24	24123	11-14	10	12	23-23	16	1
United Kingdom	R1b1a2a1a1b4	24	81136	11-15	10	12	23-23	15	1
England	R1b1a2a1a1b4	24	95499	11-14	10	12	22-23	17	1
Scotland	R1b1a2a1a1b4	24	125553	11-14	10	12	22-23	17	1
Northern Ireland	R1b1a2a1a1b4	24	191515	11-15	10	12	23-23	15	1
France	R1b1a2a1a1b4	24	224274	11-15	10	12	23-23	15	1
Ireland	R1b1a2a1a1b4	25	11435	11-15	10	12	23-23	14	1
Unknown Origin	R1b1a2a1a1b4	25	53579	11-14	9	12	23-23	18	1
Northern Ireland	R1b1a2a1a1b4	25	121376	11-15	10	12	23-23	15	1
Wales	R1b1a2a1a1b4	25	133436	11-16	10	12	24-25	16	1
Unknown Origin	R1b1a2a1a1b4	25	133988	11-15	10	12	23-24	15	1
United Kingdom	R1b1a2a1a1b4	25	147534	11-14	10	12	23-23	16	1
England	R1b1a2a1a1b4	25	147536	11-14	9	12	21-23	13	1
United Kingdom	R1b1a2	25	200075	11-14	10	12	22-23	14	1
Ireland	R1b1a2a1a1b4	25	206262	11-14	10	12	22-23	18	1
Ireland	R1b1a2a1a1b4	26	30889	11-15	10	12	23-23	15	1
Unknown Origin	R1b1a2a1a1b4	26	87805	11-15	10	12	23-25	15	1
France	R1b1a2a1a1b4	26	182980	12-14	10	12	23-23	16	1
Ireland	R1b1a2a1a1b4	27	18396	11-16	10	12	23-23	16	1
England	R1b1a2a1a1b4	27	234946	11-14	10	12	22-23	15	1
United Kingdom	R1b1a2a1a1b4	28	173673	11-14	9	12	23-25	15	1
Unknown Origin	R1b1a2a1a1b4	30	230096	11-14	9	12	23-23	13	1

Table 4. Colla key marker matches to R-L21 non-Collas.

It is surprising that so many Colla Key marker matches were found among the R-L21 non-Collas (Table 5). With as many as 13% having 2 key marker matches and 44% having one match, it would appear that these key marker values are a property of R-L21/DF21 as a whole rather than being specific for Colla exclusively. They indicate the most likely ‘stock’ from which Colla arose.

Relationships

The first 68 testers (cut-off at two marker matches) from Table 4 were compared with 103 known Collas in McGee (with 425 disabled) to identify any significant relationships between Colla and non-Colla. The significance level @67 markers is GD values of 9 or less.

Table 6 shows the relationships identified. The two non-Collas with the lowest GD to DURRQ, Corbitt and Long, exhibited most relationships with Collas. There is always the possibility, although unlikely, that some or all of these non-Collas were misclassified by FTDNA.

Key Markers	No.	%
4	0	0
3	4	1
2	64	13
1	220	44
0	206	42

Table 5. Distribution of Key Matches

ID	Non-Colla	GD DURRQ	Related to Collas	at GD of 9
134487	Francis Corbitt,b.c.1790,Ballymena,Antrim,Ireland	9	412Peden 112Walker 173Calkins 930Calkins N16Calkins 150Calkins 401McDaniel 167OCarrol 306Carroll N41Carroll 146Mahan*	9 7 9 8 8 9 9 8 9 7 6
78252	William Long, b 1740, d 1800 Penn	10	166Beggan 334Carroll 100McKenna 171McKenna 146Mahan*	9 9 9 9 7
156866	William Broom b abt 1800>Daniel Broom, b.1822 S.C.	11	829McQuillen	9
42048	Cornelius Erwin, b. c. 1780 Ireland	13	368Paden 150Calkins	9 9

* Representative of a non-Colla cluster

Table 6. Relationships of R-L21 non-Collas to Collas at GDs of 9 or less at 67 markers.

Not a lot can be deduced from these relationships other than a suggestion that these non-Collas were from the same ‘stock’ as the Collas and evolved independently in parallel with the Collas. High GD relationships would be expected for those branching early in the evolutionary tree.

Conclusions

From this examination of the R-L21 population, the following conclusions were drawn:

- The distinguishing Colla values of 9-0-9 for markers 511, 425, 505 are a unique part of the larger L21/DF21 population. The most common values for these markers are 10-12-12 (core values) accounting for 71% of the L21 and descendant SNP populations.
- Markers 511 and 505 have exhibited the expected variability across the spectrum, showing increased number of copies (forward mutation) and decreased number of copies (reverse mutation) from the core values.
- It is proposed that the occurrence of a Colla precursor such as 9-12-9 would have been a rare event. The configuration of 9-0-9, following a deletion at 425, must have been amplified early in the L21 population in order to achieve its present day high representation in L21.
- Within the wider L21 population, two groups were identified carrying a null value for marker 425. The main one was Colla with a 9-0-9 configuration together with two variants, 9-0-10 and 10-0-9, attributable to single step mutations in 505 and 511. The second group consisted of three independently arisen non-Collas carrying the 425 null.
- Colla key markers are a good indicator of Colla when accompanied by the null value at 425. Otherwise, they only indicate the background population from which Colla arose. 58% of non-null L21 had between 1 and 3 key marker matches.
- A limited number of non-Collas had distant relationships (around GD of 9) with some Collas. These non-Collas were probably representatives of Colla kinsmen who evolved in parallel with them. It was not possible to identify any obvious non-null Colla precursor.