

**McMahon DNA**  
**- A Genetic Odyssey-**

**An Analysis of DNA material pertaining to known McMahon Testers**



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# 1. Introduction

Early Irish genealogy describes the appearance in Ulster in about A.D. 330 of the three Colla brothers, known as Colla da Crioch, Colla Uais and Colla Meann. Their arrival was allegedly at the behest of the High King of Tara. Their descendants have been kings, lords, chiefs, and saints. Their history survived through oral tradition and eventually written histories as evidenced below (Ref 1).

## **The Three Collas**

The three sons of Eochaidh, great their fame,  
The three Collas we have heard of;  
Colla Meann, Colla fo Chri,  
And Colla Uais the high king.

The names of the three I know,  
And they slew the high king  
On yon wide bright plain,  
Aodh Muireadhach and Cairioll.

Cairioll, Colla Uais the king,  
Muireadhach, Colla fo Chri,  
Aodh, Colla Meann, great his fame;  
These three were mighty beyond all strength.

To quote Katherine Simms<sup>1</sup> ...” *The myth of the invasion of Ireland by the sons of Míl or Milesius is only relevant to the researcher of medieval history because it provides the framework within which the later genealogies were arranged. Every later surname was ordered under its earlier dynastic group, its wider population group, and its presumed descent from a son of Míl. For example, the Mac Mathgamna or MacMahon (surname) chiefs of Monaghan, together with their collateral Ó Cerbaill or O’Carroll (surname) kinsmen, belong to the Uí Nadslúaig dynasty within the Airgialla (population group), a federation of mid-Ulster kingdoms who claimed descent from the Three Collas and ultimately from Eremón son of Míl”* (Ref 2).

This can be regarded as the authentic genealogy for Monaghan McMahons - there are other references saying much the same thing as well. However the difficulty is that not all McMahons (from Monaghan and elsewhere) carry the DNA that we think is representative of Collas (i.e. having the DNA shared with other known Colla surnames); we have to accept that there were multiple origins for McMahons (as indeed for many other surnames as well). From a previous study (Ref 3), it was concluded that Colla DNA was present in Oriel (Airgialla) Clans such as Carrolls, McKennas, McMahons, McGuires and many others. In addition, there were strong contingents representative of Wales such as Calkins and Rodericks and of Scottish names such as McDonald, McDaniel, Paden etc. This, in conjunction with the occurrence of the null mutation (a key indicator of Colla DNA) at the beginning of the first millennium, is strongly suggestive that the Colla tribe was well established and had branched in NW Britain before coming to Ireland. It is well documented that the three Colla brothers arrived in Ireland about A.D. 330, allegedly as mercenaries to the High King. As such it has to be assumed they were trained soldiers (presumably Roman) and would have been accompanied by a band of warriors (otherwise they would never have established themselves in a hostile environment). A further assumption might be that the band of warriors was composed of their 425 null bearing kinsmen, kinsmen without the null and co-opted non-kinsmen. In fact, in order to conquer Oriel (which they did), it must have been a mercenary army.

Having first examined Colla inheritance (Refs 3 & 4), this analysis is concerned chiefly with a detailed analysis of MacMahon data within the context of the 425 Null Project.

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## 1.1. Aim

The aim of this analysis was to try and deduce, given the limitations of some of the data, the relationships between those testers having the McMahon name, phonetic versions of the name, other Colla and non-Colla names and particularly to explain the wide diversity in genetic differences (GDs) and clustering.

## 1.2. Methods, Sources, Limitations and Assumptions

The starting point for this study was the analysis and subsequent evaluation of Y-chromosome sequencing. Analysis was performed with the aid of Excel spreadsheets and freely available tools from the internet. Profile comparisons were made by comparing the number of mutational differences between profiles. This measure is called Genetic Difference (GD).

McMahon profiles were collected from a number of databases. The database included derivative names such as: McArdle, McHugh, McPhillips, Mathews. Other surnames (which were phonetic) associated with McMahon such as Mahon, McMahan, Mahan, McManus, were also examined. Some of the data was for closely associated names such as Carroll and McKenna were retained as representative of common Colla ancestry. Other (non-Irish) names (Bognor, Herrington etc) were in the database because FTDNA indicated they were close (DNA) matches. The remaining data was combined and sorted by haplogroup and number of DYS tests performed. Each sub-group was ranked by number of key markers and then by genetic difference (GD) from the Colla modal (DURRQ) culminating in a detailed cluster analysis.

The main limitation in this analysis was the small number of McMahon testers, especially for those with geographic origins in Monaghan who had also tested for 67 markers. The reference profile used throughout was the DURRQ<sup>2</sup> modal. A total of 108 unique records were evaluated @ 25 markers, 59 @ 37 markers and 33 @ 67 markers.

The main assumption in this evaluation was that testers who were at least R1b1a2 (and who, should they test, be R1b1a2a1a1b4)<sup>3</sup>, had a DYS 425 value of 0 and a GD <12 to DURRQ @ 67 markers, had Colla DNA. Testers who didn't meet these criteria were classified as non-Colla. This assumption rests on the premise that L21+ people (R1b1a2a1a1b4) who met the above criteria were part of a stable population descended from a single progenitor. The probability of both these very stable mutations (L21+ and DYS 425 null) occurring simultaneously by chance (as opposed to been inherited), is remote.

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<sup>2</sup> DURRQ is the Y-search ID for the Colla modal profile.

<sup>3</sup> Most recent classification by FTDNA.

## 2. Results

### 2.1. Key Markers

Those tested to 67 markers could have a maximum of 8 key markers; those tested to 37 markers, a maximum of 4 key markers and 3 key markers if tested to 25 markers.

Having near maximum numbers of key markers was a good, although not always an infallible, indicator of Collaness. The data set which proved to be non-null had very poor representation of key markers as expected. The GDs followed this classification being less than 12 for those with the null and greater than 12 for those without. The distinction persisted at 37 markers where there was a sudden increase in GD from 4 to 14. Results were less clear cut at 25 markers although those showing 2/3 key markers would probably have more if tested further.

Five profiles in the database were in completely different haplogroups to R1b. They had huge GDs from DURRQ indicating that they were unrelated to those in the R1b haplogroup. Two of these had a null at 425 showing that this mutation was not unique to the R1b haplogroup.

### 2.2. McGee Analysis

The data was grouped into 25, 37 and 67 marker values and examined in the McGee Utility Tool. The distribution of names at each test level is shown in Table 1.

Test Level	McMahon	Phonetic	Other Colla	Colla name only	Non-Gaelic	Totals
67 marker	13	8	5	1	6	33
37 marker	31	14	5	3	6	59
25 marker	42	38	17	5	6	108

Table 1. Distribution of names at the different test levels.

The McMahon category included documented derivative names such as Matthews and McArdle. The phonetic group consisted of perceived miss-spelled or miss-pronounced names such as McMahan. Other Colla were names such as Higgins who had McMahon type profiles. Colla name only had a Colla name but not Colla DNA. Non-Gaelic names were English type names such as Hancock with McMahon DNA.

### 3. Clusters

				McMahon*	Phonetic	other Colla	Colla name only	Non-Gaelic	Totals	
67 mk	R1b1a2	N	CI 1	6		2		4	12	
		N	CI 2			2			2	
		N	Uncl	2		1		1	4	
		N-N	CI 3		2				2	
		N-N	CI 4	2					2	
		N-N	CI 5		2				2	
		N-N	CI 6	1	1				2	
		N-N	CI 7	1					1	
		N-N	Uncl			2		1	3	
									30	
		Non_R1b1a2	N	Uncl				1		2
			N-N	Uncl	1	1				1
										3
			totals	13	8	5	1	6		
								total @ 67	33	
37 mk	R1b1a2	N**	CI 1	11	1	2		5	19	
		N**	CI 2			2			2	
		N**	Uncl	3		1			4	
		N-N**	CI 3		3				3	
		N-N**	CI 4	3					3	
		N-N**	CI 5	1	3				4	
		N-N**	CI 6	1	1				2	
		N-N**	CI 7	2					2	
		N-N**	Uncl		5		2	1	15	
									54	
		Non_R1b1a2	N**	Uncl	1			1		2
			N-N**	Uncl	2	1				3
										5
			totals	31	14	5	3	6		
								total @ 37	59	
25 mk	R1b1a2	N**	CI 1	15	3	12		5	35	
		N**	CI 2			2			2	
		N**	Uncl	3		3			6	
		N-N**	CI 3		8		1	1	10	
		N-N**	CI 4	5	7				12	
		N-N**	CI 5	1	3				4	
		N-N**	CI 6	1	2				3	
		N-N**	CI 7	2					2	
		N-N**	Uncl		13		3		28	
									102	
		Non_R1b1a2	N**	Uncl	1			1		2
			N-N**	Uncl	2	2				4
										6
			totals	42	38	17	5	6		
								total @ 25	108	

Table 2. Distribution of names and clustering. \* includes McMahon derivatives McArdle, Matthews. \*\* Deduced by association. N = Null at 425, N-N = Non-Null at 425. CI=Cluster; Uncl=unclustered.

The largest and most obvious cluster was that previously defined as ‘Monaghan McMahon’ (Ref 5). In addition to McMahons and some derivative names, this also contained a sizable number of Non-Gaelic names. This was very large at the 25 marker level and included some ‘Other Colla’ and ‘Phonetics’. Resolving power improved (and the clusters got smaller) as the test level increased. The 67 test level was the standard and the only level at which presence or absence of the 425 null could be determined. Those clustered at lower test levels with known nulls or non-nulls were deemed to be null or non-null by association.

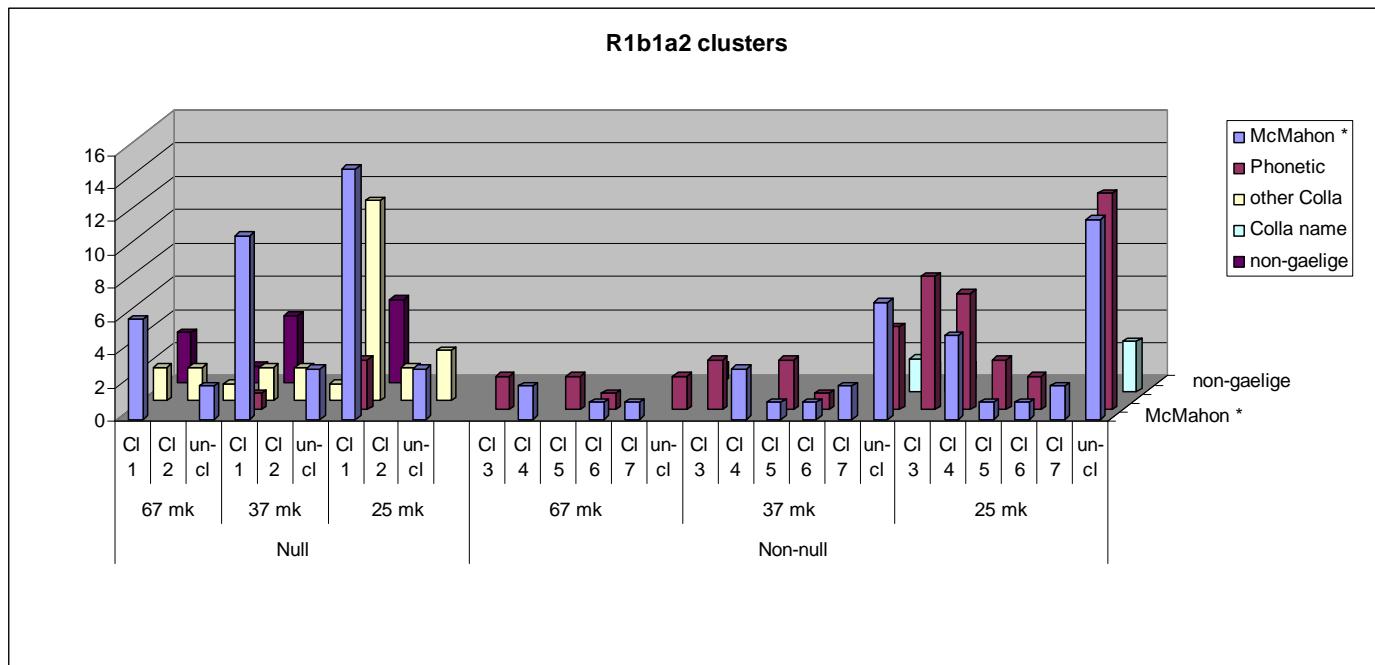


Figure 1. Graphical representation of R1b1a2 data from Table 2.

Table 2 and Figure 1 show these results summarised under haplotype, null, non-null and test level. Among the nulls, there is only a single McMahon cluster (Monaghan cluster) (Cl 1), a McKenna one (Cl 2) (retained for comparative purposes), three unclustered McMahons and three unclustered ‘Other Collas’.

All the remaining clusters are deemed to be non-null and are called ‘Mahan’ (CL 3), ‘Fermanagh McManus’ (Cl 4), ‘McMahan/McMeekin’ (Cl 5), ‘Shannon’ (Cl 6), ‘Irish Type 3’ (Cl 7). The remaining non-nulls are unclustered. Finally, there are up to five non-R1b1 haplotypes who have qualifying names but are totally unrelated.

The Colla McMahons (Monaghan Cluster) are the majority among the nulls but still in the minority in the whole McMahon database. Surprisingly, only one Phonetic (a McMahan) clusters in the Monaghan Cluster. The remainder cluster quite distinctly as non-nulls.

There are at least two Colla McMahons (39409, 13852) and probably a third (34826) who do not cluster with anyone. These are most likely single representatives (living today) of lines that have died out<sup>4</sup>. Their high GDs would suggest early branching from the Monaghan McMahons.

### 3.1. Non-Nulls

For testers, excluding the non-R1b1a2 haplotypes, the distribution of nulls and non-nulls is shown in Table 3a.

4 Equally, it could simply be that no other McMahon from that line has tested yet.

Test level	67 marker	37 marker	25 marker
Null @425	18	25	43
Non-null @ 425	12	29	59
totals	30	54	102

Table 3a. Distribution of Nulls and Non-nulls at the different test levels.

For McMahons only, excluding the non-R1b1a2 haplotypes, the distribution of nulls and non-nulls is shown in Table 3b.

Test level	67 marker	37 marker	25 marker
Null @425	8	14	18
Non-null @ 425	4	14	21
totals	12	28	39

Table 3b. Distribution of McMahon Nulls and Non-nulls at the different test levels.

Given the provenance of the McMahon name, it's surprising that so few have the Colla DNA. The actual proportions at the higher test level can be attributed to some extent to the non-random testing but nevertheless shows the name is representative approximately equally among the nulls and non-nulls. About half the nulls are either close Colla relatives or McMahon look-alikes (the non-Gaelic category).

### 3.2. Other Clusters

Other clusters were apparent among the non-nulls but were only well defined at the 25 and 37 levels<sup>5</sup> (Table4). Clusters 6 & 7 are tentative as the numbers at the 25 test level were less than 4. As a general rule, the higher the GD the more distant the clusters are from Monaghan McMahons.

### 3.3. Other modals

The data was run against other modals at the different test levels (Table 5). The most significant results to emerge were the two McMahons (cluster 7) who matched 'Irish Type 3' modal. This is the only evidence to suggest that these represented Thomand or Clare McMahons; none of the other profiles came near to matching this modal. The other significant result was the two McMahons who matched 'Airghialla 2' modal (formed part of Cluster 4). Western Atlantic modal is not very discriminatory and so nothing useful can be deduced from those that matched it. One McMahon matched the 'NW Irish' modal.

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5 Generally too few tested to 67 markers to be able to call them clusters @67. However, if clusters were evident at lower test levels, it could be assumed that these would manifest themselves should they test to the higher level.

Names	Test Level	Mahan	McMahan	Mahon	McPhillips	McMahan	McManus	Mathews	McMeekin	McMahan	Other
Cluster 3 (Mahan)	@25	6	1	1	1						
	@37	2	1								
	@67	1	1								
Cluster 4 (Fermanagh)	@25					4	7	1			
	@37					3					
	@67					2					
Cluster 5 (McMahan McMeekin)	@25		1			1			1	1	
	@37		1			1			1	1	
	@67								1	1	
Cluster 6 (Shannon)	@25			2		1					
	@37			1		1					
	@67			1		1					
Cluster 7 (Irish Type 3)	@25					2					
	@37					2					
	@67					1					
Unclustered	@25	1	2	5	1	12	2				5
	@37	1	1	3	2	7					1
	@67			2							1

Table 4. Distribution of Names in the non-Null Clusters and in the non-Null Unclustered.

Modal	S Irish (Eoghanact?)	NW Irish	W. Atlantic	Irish type3 (Dal Cais?)	Leinster	Airghialla 2 - P1
at 67 mks - GD<5	none	none	none	110326_McMahan	none	142902_McMahan 124546_McMahan
at 37 mks - GD<6	none	none	146378_Mahan 18480_Mahon 53092_McPhillips	110326_McMahan 173058_McMahan	none	not tested
at 25 mks - GD<4	ZNJY4_Carroll 59084_McMann	172555_McMahan	Mahan cluster DU7DK_Hughes 27184_Hughes * 61096_Hendrickson * 45125_McMahan D8MC4_Hancock 31799_MacMahon 173055_MacMahon *	173058_McMahan 110326_McMahan	53092_McPhillips	not tested

Table 5. Summary of results against modals other than DURRQ.

### 3.4. Time to Most Recent Common Ancestor

Times to Most Recent Common Ancestors (tMRCA) were calculated from the 145687 profile as this was L21+, had a GD of 4 from the modal, 8/8 of the key markers and recent ancestors hailed from the Carrickmacross area of Monaghan. Values obtained from the 67 marker data only are shown, these being considered the most accurate (as opposed to 37 or 25 marker data).

The one thing of note is that there are now four McMahanos (within the Monaghan Cluster) who are closely related albeit 500-900 years ago (at 90% probability). Even more interesting is the 17/18th c.



ancestors come from a few miles of each other – two (145687, 14876) thought to be from the same Parish, Magheracloone outside Carrickmacross.

### **3.4.1. Schematic**

The following schematic (Figure 2) is an attempt to draw together the different evolutionary lines and show their spatial relationship to each other. Only those who formed clusters @ 67 markers (26 testers) and the three non-R1b1a2 testers are shown. The thick black arrows depict R1b1a2 and its branches including R1b1a2a1a1b4 (L21+). The working hypothesis is that the DYS null mutation occurred about the beginning of the first millennium and is shown in red. Lines of descent for Collas including the reference one (bold) are shown.

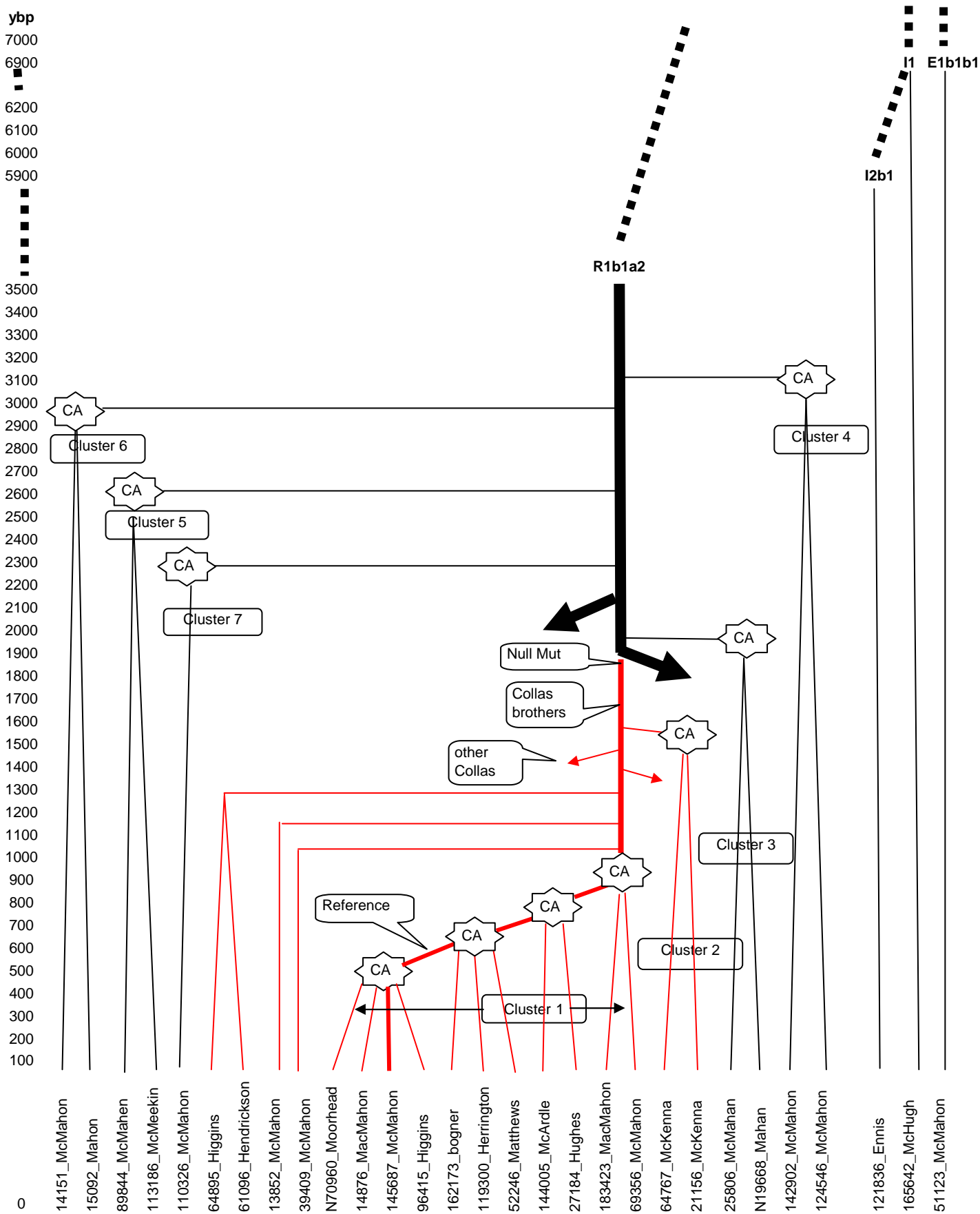


Figure 2. Schematic Tree for McMahon descent. Ybp = years before present. CA = common ancestor. The assumption is that the null mutation occurred in the L21+ line about 1900-2000 years ago and evolved separately from L21+ from then on.

## 4. Surnames

One of the main difficulties in this (and other) DNA genealogy studies is how surnames were acquired. In c. A.D. 950 in Ireland (and a century later in Britain), surnames came into usage. It's hard to imagine the process being other than gradual, without central control and probably chaotic. Up to that time, there would have been tribal cohesion so that tribal members would know they belonged to a certain tribe without knowing their exact relationship to each other<sup>6</sup>. This knowledge would have remained over time even when tribal branches split away and remained geographically close. The hypothesis is that when a tribal leader decided to adopt a name that this name would apply to all members of his tribe.

Irrespective of the precise method of name allocation, the following observations (from this and other studies of the 425 Null Project data) would have to be accommodated:

- Not all carriers of Colla names such as McMahan are in the L21+ haplogroup (e.g. one McMahan in I2a, one in E1b1b1).
- Only about 25-30% of well documented L21+ Colla names such as McMahan, Carroll, McGuire carry the 425 null and by definition are Colla descendants.
- There are as many non-Irish named Colla testers as there are Irish named Colla testers<sup>7</sup>.

### 4.1. Tribal drift

The archaeological and genealogical evidence indicates a westward and north westward movement of bronze-age Celts through Europe. Among these would be the L21+ line which started north of the Alps about 4,000 years ago. Judging by today's distributions of L21+ (Ref 7), the heaviest concentrations are found in Ireland and the Celtic fringes of Britain. It is estimated they could have started to populate Ireland about 3,000 years ago. By the time the Romans came to Britain, these Celtic people (by now, Iron-age Celts) would have subsumed earlier cultures and diverged from one another over the 30 or so generations. They probably developed into tribal groups as they did in Ireland which the Romans, for their administrative convenience, gave them names such as the Trinovantes, Cornovii etc. Genetically, they would have similarities and differences as exhibited between Irish tribes. There arose in one such L21+ tribe, the relatively rare and stable null mutation at DYS 425, which our working hypothesis claims is the key identifier of Colla DNA. A trawl through the L21+ Project showed that only about 5% had this Colla DNA.

### 4.2. British Celts

The DNA evidence would appear to indicate that the ancestors of the Colla brothers were part of a gradual westward migration through Britain to Ireland in either pre-Roman or Roman times. A previous study positioned the null mutation as having occurred shortly before the Roman invasion of Britain (Ref 4). Interestingly, a present-day Roderick family who have Clan Colla DNA traces itself back to southern Wales near Caerleon, a town occupied by the Silures just north of the Bristol Channel and where the Roman city of Isca Silurum thrived from 75 A.D. to 410 A.D. Prior to that, the local Celtic people, loosely defined as Silures, mounted a fierce resistance c. 48 A.D. to the Roman conquest. It is therefore possible that the ancestors of the Colla brothers formed part of a minor Celtic exodus to Ireland following the collapse of that resistance in the first century A.D.

A similar argument could be made for yet another family, the Calkins, who are also of Clan Colla and come from Cheshire/North Wales, being proto Colla and originating in another Roman Town, Chester. Equally, they could have come from any part of Britain, propelled westward by the

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6 Under Brehon law, the practice of polygamy was encouraged; the concept of 'family' as we know it today would have been irrelevant.

7 The tester samples may be non-random in nature and therefore not represent the true ratio; the bias may be due to enthusiastic testing by large family groups such as Calkins.

Romans following failed uprisings such as Bodicea's in East Anglia. This family might bear a derivative of the original tribal name, Colla Kinsmen or abbreviated to Colla-kin.

In addition to the above names representing Wales, there is an equally strong contingent of Scottish names. This, in conjunction with the occurrence of the null mutation at the beginning of the first millennium, is strongly suggestive that the Colla tribe was well established and had branched in NW Britain either before or about the same time as coming to Ireland.

The most colourful explanation of Colla origins has been put forward by Don Schlegel in the Clogher Record (Ref 6). He states that the Collas are perhaps the only instance in prehistoric or early historical Ireland of three brothers having each a personal name, a name in common, and an epithet. The implication is that such a naming convention must have been imported, and the obvious source is the Roman Empire. He suggests they were not descended from Irish Kings but instead were Romanized Britons, originating in the Celtic tribe named Trinovantes (who fought with Bodicea) from Colchester, the oldest recorded Roman town in England. They received military training from the Romans and eventually went to Ireland as mercenaries in the service of the King of Ireland<sup>8</sup>.

Whatever the starting ratios of null to non-null were and how these fluctuated over time, we know that among today's descendants, only about 25-30% have the 425 null. It is not possible to track back from today's ratios to establish the starting ones as too many survival factors would have been involved. In addition, during the course of their warlike activities they would have enslaved/subsumed their defeated enemies who could have been part of an earlier indigenous population thus possibly accounting for the few from haplogroups E & I with a Colla name.

Following their successful campaigns in Ulster, the Colla tribe would have continued to diverge both genetically (other DYS markers) and geographically but those with the null would continue to retain it. At a much later date (c. A.D 950), surnames were gradually adopted by the various Colla branches and depending on where they were living and to which Colla chieftain they owed fealty to, they would have been granted that name irrespective of their DNA. Thus, those living in different parts of Oriel became Carrolls, McKennas, McMahons, McGuires etc. Clansmen with the null and without the null would have adopted the Oriel surnames associated by clan tradition.

#### 4.2.1. What's in a name

From a genealogical point of view, and without documentation going back beyond 18<sup>th</sup> c<sup>9</sup>, not a lot. Many 'Mac' names are patronymic in that they simply mean 'son of' Mahon etc. Mahon was a common first name and is known to have been used by about 20 unrelated tribes probably leading to some of the observed unrelated profiles (there are as many unrelated McMahons as related ones).

One of the striking observations was the large number of non-McMahons closely matched to the Null bearing (Colla) McMahons. Some of these (Bogner, Boyce) are known to be adopted names but there are still many others. One of the strangest is D8MC4\_Hancock who is the closest match to DURRQ, has 7 out of 8 key markers but no null at DYS 425. It seems improbable that this profile could have occurred by chance and even less likely by a reverse mutation (if ever).

Another difficult one to explain is Hendrickson. As the name implies, his recent ancestors hail from Sweden but he is more closely matched to an O'Carroll than to McMahan. A possible explanation could be the enslavement of an O'Carroll family who eventually took the Hendrickson name while living in Scandinavia or a Norse settlement.

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<sup>8</sup> Roman Britain, unlike Ireland, had an excellent network of roads connecting their towns and major forts. A small army of trained soldiers could have marched, from say Colchester to Chester, in a matter of days.

<sup>9</sup> This applies to most people whose origins were in Ireland.

### 4.3. Matching to non-McMahons

At first this was a real puzzle and suggestive of non parental events (NPE). However, on closer examination these would seem if anything to be ‘reverse’ NPEs for at least six cases examined<sup>10</sup>. Using the matched non-McMahon name as seed in Y-search (Ref 8), the data for the remaining records were compared to the DURRQ modal and kit 145687. The results are summarised in Table 6.

name	ID	GD to DURRQ	GD to 145687	GD of Kin (to DURRQ)	No of Kin
Hancock	D8MC4	0	3	12 or >	21
Herrington	119300	2	3	11 or >	9
Higgins	96415	3	3	13 or >	21
Higgins	64895	7	3	8,13 or >	21
Boyce	V52NK	1	3	14 or >	7
McQuillen	5YFJD	1	3	3,7,18,19,20	5

Table 6. Genetic Distances to the DURRQ Modal for 6 matched non-McMahons @ 37 markers. ‘Kin’ refers to the remainder of the sample for each name.

From these results it is clear that the matched non-McMahons are unrelated to their name sakes (exceptions are two McQuillen and a Higgins) and could have originated from a McMahon (or a close Colla) progenitor. Although fairly closely related to kit 145687, they are in most cases, even closer to the DURRQ modal.

### 4.4. Derivative Names

Two derivative names of McMahon, McArdle and Matthews, are well documented and are included under the McMahon heading. Names such as McHugh, McPhilips, McManus could be McMahon derivatives but equally, could have arisen in any clan as they were in common usage as first names. McArdle is well documented as a McMahon derivative and it so happens that the samples here confirm this. McHugh on the other hand is not always so clear cut.

### 4.5. Where are the Clare McMahons?

The short answer is, there are no obvious clusters which relate to the Irish Type 3 (Dal Cais) modal (O’Brien and related surnames in Limerick, Clare and Tipperary) with the exception of a pair of McMahons (173058 & 110326). The O’Clery Book of Genealogies have pedigrees for fifteen Dal Cais septs but the main three or four families seem to be O’Brien, McMahon, O’Kennedy and McNamara, all of Clare or Thomond. If any two families from these groups should match their DNA, it is the O’Briens of Thomond and the MacMahons of Thomond. The only McMahon DNA samples found to match the Type III Irish modal were the two listed profiles.

Admittedly, early data collection was biased towards McMahons having Ulster origins; this however, should not have precluded Clare McMahons (who today are thought to be more numerous than Monaghan ones), given the randomness of DNA testing. Either those matching Irish Type 3 are the only representation of Clare McMahons or the Clare McMahons only match to the more general Western Atlantic modal. Either way, it hasn’t been possible to detect any relatedness to O’Brien other than possibly the above two.

<sup>10</sup> Their low GDs to the modal and the reference McMahon suggest these NPE events took place 300-400 years ago suggestive of McMahon raids across the Pale or later on settler homes.

## 4.6. Acquisition of the McMahon Name

The evidence indicates that acquisition of the McMahon Name was not a logical process in that candidates did not have to have homogeneous DNA in order to qualify<sup>11</sup>. By that is meant that only about half had Colla DNA (null at 425) and the remainder had not. The non-null McMahons could have arisen within Oriel or in other parts of Ireland by being called the ‘son of Mahon’ (any clan) or by being present when the McMahon Chieftain was bestowing his name on his family and vassals.

	<b>R1b1a2</b>	<b>McMahon</b>	<b>Phonetic</b>	<b>other Colla</b>	<b>Colla name only</b>	<b>non-gaelige</b>
<b>Nulls</b>	At 67 mks	8	0	5	0	5
	Extra at 37	6	1	0	0	0
	Extra at 25	4	2	12	0	0
	max possible	18	3	17	0	5
<b>Non-nulls</b>	At 67 mks	4	7	0	0	1
	Extra at 37	10	5	0	2	0
	Extra at 25	7	21	0	2	0
	max possible	21	33	0	4	1

Key:

<b>McMahon</b>	includes MacMahon, McArdle, Matthews,
<b>Phonetic</b>	McMahan, Mahan, McMeekin, McMahan, Mahon, MacKin, McMannes, McManus
<b>other Colla</b>	McHugh, Hughes, Higgins, McPhilips, Carroll, McQuillen, Farrell Devine, McNally, McKenna,
<b>Colla name non-gaelige</b>	(less Colla DNA), McPhilips, Carroll, McHugh, Hancock, Moorhead, Bogner, Herrington, Hendrickson, Norwood

Table 7. Distribution of McMahon and associated names with and without Colla DNA.

Tests at 67 markers are the only definitive tests where it can be established unequivocally whether someone has Colla DNA or not (by having or not having the null) (Table 7). Rows showing ‘extra at 37 and 25’ reflect the greater number of testers at these levels whose results can be classified (by association) as shown in Table 7. The row ‘Max possible’ indicates the probable outcome should low level testers upgrade to 67 marker tests.

The results in Table 7 indicate that about half of McMahons have Colla origins and the rest do not. Interestingly, nearly all the Phonetics (except for 1 McMahan @37 and 2 @ 25) are non-null and where they cluster, they are distinct from McMahons. This demolishes the commonly held view that most of these phonetics were simple spelling or pronunciation mistakes.

## 4.7. L21+ (R1b1a2a1a1b4)

Again because of limited testing, only 9 proved to be L21+ (R1b1a2a1a1b4), the qualifying haplotype for Colla, all of whom had the null; five of these were in Cluster1, the remaining four being unclustered (Table 8). It is probable that many more, especially in Cluster 1, would prove to be L21+, should they test.

<sup>11</sup> The DYS markers used in tracing origins did not have any distinguishing physical characteristics. Other than memory over a few generations, there was no way to vet claimants. Naming obviously wasn’t confined to known blood relatives.

## L21+ Haplogroup

Cluster 1			Unclustered		
McMahon	Other Colla	Non-gaelige	McMahon	Other Colla	Non-gaelig
145687_McMahon	96415_Higgins	162173_bogner	39409_McMahon	64895_Higgins	61096_Hendrickson
69356_McMahon			13852_McMahon		
52246_Matthews					

Table 8. Distribution of L21+ (R1b1a2a1a1b4) haplotypes.

### 4.8. Definitive Colla McMahons

The four McMahons shown in Table 8 are fully qualified as Colla McMahons. In addition, their known recent ancestors come from the Carrickmacross area of Monaghan and Armagh (for 39409). The data for the null category is further expanded (and includes associates and those who haven't taken the deep clade test) and is shown in Table 9.

	Haplogroup	Origin	ID	GD to DURRQ	First names	90% tMRCA (to 145687)
{	R1b1a2	Carrickmacross/Mon	183423_McMahon *	4	Joseph Vincent	930
	R1b1a2	Carrickmacross/Mon	14876_McMahon *	3	Raymond Fowler	570
	R1b1a2a1a1b4	Carrickmacross/Mon	145687_McMahon *	4	Patrick Ciaran	
	R1b1a2a1a1b4	Carrickmacross/Mon	69356_McMahon *	6	John Edmund	930
	R1b1a2	Scotland	144005_McArdle *	5	James T	810
	R1b1a2a1a1b4	Ireland	52246_Matthews *	4	Thomas Francis	690
	R1b1a2	unknown	27184_Hughes *	5	?	810
	R1b1a2a1a1b4	Ireland	96415_Higgins *	5	Charles	570
{	R1b1a2	Monaghan	64767_McKenna	7	Gerard	1500
	R1b1a2	Monaghan	21156_McKenna	10	Gerard	1620
{	R1b1a2a1a1b4	Armagh	39409_McMahon *	7	Michael Oliver	1020
	R1b1a2a1a1b4	Monaghan	13852_McMahon *	11	William Alvin	1140
	R1b1a2a1a1b4	unknown	64895_Higgins *	9	?	1260

Table 9. tMRCA to 145687 of Nulls (less Non-Gaelic category) @ 67 markers.

## 5. Discussion

The difficulty in an analysis such as this is in how to interpret the large variability encountered. For a single name such as McMahon in this case, there was haplogroup, DNA and name variability. Approaching this from a DNA point of view meant that the other variables had to be accommodated in whatever hypothesis or model of evolution was proposed for McMahons. Without further study, it is difficult to know if the observed patterns of inheritance were unique to McMahons or were generally similar to other Celtic clans.

The most obvious distinction to emerge was the contrast between what was defined as Colla and Non-Colla DNA. The Colla DNA had not only McMahon, McArdle and Matthews closely clustered with other Colla names but strangest of all, a sizeable proportion of English names. This was termed the Monaghan McMahon Cluster. Without names, these DNA profiles look to be part of a homogeneous population (of McMahons). How this came about is speculative but it is known that at least two were adopted names. Adoption and other social name-changing events alone could hardly account for half of this category being non-McMahon. The other (and possibly additional) explanation is that of non-parental events (NPE). It is easy to visualise McMahons dropping in on their Colla neighbours in a more or less friendly fashion but not so easy for a less than friendly visit across the Pale or to settler homes. No doubt all of these activities took place in varying degree during the period when McMahons held sway over much of Oriel (c. late 12<sup>th</sup> c. to 16<sup>th</sup> c.). Reinforcing this view is that, where it was possible to test, these Colla DNA interlopers were generally unrelated to their namesakes (Table 6) and thus must have acquired their DNA from McMahon progenitors or at the very least, from a closely related Colla progenitor.

Non-Colla DNA is totally different. It is characterised by the absence of the null mutation at DYS 425, having GDs greater than 11 to the modal and significantly lower numbers of key marker values. Several well defined clusters were defined which consisted mainly of phonetic names. There were however, three putative further McMahon clusters (which also contained phonetic names). These were Airghialla 2, Shannon and Irish Type3, all of which were totally unrelated to the Colla McMahons. This unrelatedness was demonstrated best by the high tMRCA values (tending towards 3,000 years) to the Colla McMahon reference. There were, among those who tested for lower number of markers, a large number (up to twelve) of unclustered McMahons. These results indicate there were many more origins for McMahon other than being descended from the Collas.

The final piece of diversity was demonstrated by those McMahons (and derivatives) belonging to totally different haplogroups (non-R1b1). Here the separation was long before even the L21+ mutation and yet they finished up with the McMahon surname. It is hard to postulate how this occurred other than suggest that the carriers of these haplotypes were initiated by Roman, Viking or Norman men within what were to become McMahon families.



## 6. Conclusions

Despite the limiting data sets, the following conclusions were drawn:

- Having the McMahan surname only gave a 50/50 chance of being descended from the Collas.
- The bulk of Colla McMahons were in a single cluster whose recent ancestors (where known) hailed from Monaghan. This Cluster was termed the Monaghan Cluster.
- There were in addition two (possibly three) other Colla McMahan lines emanating from the Monaghan area. These testers were single representatives of the lines either because they were the only survivors to have made it to the 20<sup>th</sup> century or the only ones to have tested.
- All Colla McMahons who tested sufficiently belonged to the L21+ haplogroup (R1b1a2a1a1b4).
- Many testers had typically McMahan DNA but totally different names. These were of two varieties, non-Gaelic (or typically English) names and Colla names. These names were present in such high proportions as to beg a question on the mating habits of early and medieval McMahons.
- Colla McMahan DNA was found in 8 McMahons (inclusive of Matthews & McArdle), 5 other Collas and 5 non-Gaelic names at 67 markers. Lower testing rates suggest a maximum potential of 18 McMahons and 17 other Collas having Colla McMahan DNA (no further non-Gaelic names are predicted).
- The non-Colla McMahons had a mixture of origins and had separated from the proto-Colla tribe before the DYS 425 null mutation occurred (tMRCA values to the Monaghan reference of 2,000-3,000 years). Two were 'Irish Type 3' representatives and probably Thomand McMahons and another two matched the Airghialla 2 modal.
- Most of the phonetic versions of the McMahan name were totally unrelated to the Colla McMahons. They were typified by names such as McMahan/Mahan, McManus, Mahon.
- A small but significant number of McMahons and related names were outside the R1b1 haplogroup and showed a corresponding separation of 6,000-7,000 years from Colla McMahan. These were I2a, R1a, E1b1b1 haplogroups thought to be representative of Balkin and Viking DNA. It was surmised that these were remnants of an indigenous population (present before the arrival of the Collas) or they were lines sired by invaders other than Collas.
- Most of the observed separations took place prior to the introduction of surnames in Ireland. The sorting and sifting of people who owed allegiance to the McMahan Chieftain(s) would have been in continuous flux. The introduction of naming by the Chieftain to his clan (other than to his known relatives) could have accounted for McMahan lines whose DNA was totally unrelated to Colla DNA. Alternatively (or additionally), unrelated Celts could have been the progenitors of some non-Colla McMahons.

## 7. References

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