

Larkin DNA Project - Ancestral Parish Sampling on the Shannon River

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Abstract

The Larkin DNA Project undertook a sampling effort in 2009 focused on men whose ancestors came from Irish parishes near the Shannon River with a continuity of the surname in historical records. This sampling combined with other participants yielded thirty-four (34) result sets with 37-marker Y-STR tests and Larkin paternal ancestry. Thirty-two (32) of the samples (94%) were within Haplogroup R1b and nineteen (19) samples (56%) were part of the R1b-M222 cluster. Twenty-two (22) of the samples were linked to eighteen (18) distinct Irish parishes. Fourteen (14) R1b Larkin ancestry haplotype groups were defined.

Two groups (Types 1 and 2) within the R1b-M222 cluster and associated with the Hy Many area around the Shannon River probably constitute 20% of the Larkin surname worldwide. Geographical comparison of ancestral parishes with annalistic and historical references to the Larkin surname support locating the medieval homeland of this clan, *Muintir Lorcán*, in County Galway. The median TMRCA for these two groups of Larkin men was 1,470 years which is consistent with ancient accounts that this Larkin clan descended from a son of Niall of the Nine Hostages called Máine Mór who established the Gaelic kingdom of Hy Many along the Shannon River in the 5th century CE. This finding partially corrects many 19th century Irish genealogy texts and suggests that the Larkin surname should be considered part of the R1b-M222 *Ui Niall* cadre in future surname studies. An STR mutation rate of 0.005068 was observed in known relatives within the R1b-M222 Larkin groups.

Another Larkin group (Type 7) was identified with geography consistent with the Dalcassian tribe from 9th century County Clare. The STR haplotype of this group, however, was not part of the R1b-M222 or the Irish Type III clusters.

Introduction

In the vast majority of cases, DNA project participants take a DNA test and want to know "*WHERE do I come from?*" While Y-STR DNA tests and Haplogroup identification are typically able to reveal the answer on the scale of 1,000-10,000 years, many participants would like to pursue paper genealogical research which is most feasible when the researcher can identify the geographical parish of origin.

In the case of the Larkin surname, the majority of men with this surname have patrilineal origins in the British Isles and especially Ireland. In order to make connections to specific history and geography, we need to identify both Y-STR haplotypes and their geographical location in the era of written records. At the end of 2008, the Larkin DNA Project had only four (4) Y-STR 37-marker samples which included parish-level ancestry information.

In 2009 the Larkin DNA Project embarked on an effort to obtain samples from Larkin men living in Ireland with a focus on persons with ancestral origins in parishes near the Shannon River. A presentation on the Project was given at the Larkin Clan Gathering at Portumna, County Galway in July 2009 and a number of participants joined the project at that time. In conjunction with the Gathering, an effort called *Ancestral Parish Sampling*, was made to recruit Larkin men living in or near Irish

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parishes which have a long continuity of the surname in Irish historical records such as:

- The Tithe Applotment books of the 1830s (before the famine)
- Griffith's Valuation of the 1850s (immediately after the famine)
- The modern telephone directory

The *Ancestral Parish Sampling* effort included telephone recruitment of individuals from target parishes, field visits to collect samples, and an instructional video on how to perform a cheek swab test. For 2009 recruitment focused on parishes in the Irish midlands around the Shannon River. Substantial funding was provided by a participant who wished to remain anonymous.

Definition of the Term *Ancestral Parish*

All Larkin DNA Project participants are queried for their knowledge of their patrilineal ancestors and their place of origin. In some cases, supplemental research by the author has extended our knowledge of those geographical origins.

For the purposes of this paper, the term “*ancestral parish*” refers to the geography of the 19th century Irish civil parish (as listed in the Griffith’s Valuation) in which a participant’s earliest known patrilineal ancestor lived. Note that this definition is not uniform as to the date when the participant’s ancestor lived in that parish. Some ancestors are identified back into the 17th century but some are known only to the early 20th century. This flexible definition takes advantage of the deep genealogical knowledge and research conducted by some of the participants. Generally speaking, however, the Ancestral Parish is where we have good reason to believe the participant’s ancestor lived in CE 1800.

Genealogical records in the Shannon River area are complicated by the political borders of Ireland. Most 17th-20th century Irish records are often organized by province and county. As one can gather from Figure 1 and Figure 11, three people who lived within a 4 mile radius of the junction of the Shannon and Little Brosna rivers could be found not only in 3 different counties – but 3 different provinces as well. Further, a twenty mile arc from Kiltormer, County Galway touches 6 counties. Thus, for the Larkin surname, research is best framed around parish-level information. By combining the DNA results with historical records and geography, we enhance the process of ‘peopling the landscape’ for archeological and other fields of research.¹

¹ Cuniffe C (2009) *The medieval landscape of the “O Lorcaín Clan” A preliminary analysis of their surviving archaeology*. Presentation at Larkin Clan Gathering, Portumna, County Galway.

Historical Background

Brief History of the Larkin Surname

In the Irish context, the modern word “Larkin” derives from the personal name “Lorcán” which has been noted in a variety of Irish clans and regions from times well before the Christian era. The meaning of the name is most often ascribed to the Gaelic word *Lorc* meaning fierce. There are written references to kings with the name Lorcán by the year CE 850 and written references to it as a surname in Ireland in CE 1003. This forename–surname pattern is consistent with the general trend of surnames becoming common in Ireland in the 10th century CE. The traditional explanation for the distribution of the Larkin surname has been that there were independent origins of the name with no genetic link between the ‘septs’.² In particular, 19th and 20th century genealogical writers attributed separate origins to the Larkins from Counties Tipperary and Galway.

In England, the earliest references come from Sussex and Kent counties in the late 13th century. These men are presumed to be of Anglo-Saxon ancestry. Global colonization and the Irish Potato Famine have dispersed the name in significant numbers throughout the United States, Canada, Australia, South Africa, and New Zealand. Further introduction of the surname into England and Scotland came from many Irish Larkins who emigrated in the Industrial age. Smaller migrations are known to have spread to South America and Russia as well.

Figure 2 illustrates the location of Larkin-based place names and references to the Larkin surname in Irish annals. Note a concentration of these references in the Hy Many region along the Shannon River.

Annalistic Accounts of the Hy Many Region

Numerous annals from Ireland state that a CE 5th century leader called Máine Mór established a kingdom called *Hy Many* (aka *Uí Mainé*, *Hy-Many*, *Hy Máine*) along the Shannon River, primarily in what is today County Galway (Figure 1). In the annals, many clans and surnames originate in Hy Many, including the Larkin surname.³ (See *Appendix D* for the derivation of modern surnames from Máine Mór.) While Irish annals give conflicting accounts of Máine’s parentage, an emerging view is that Máine was the last

² MacLysaght, E (1991) *Surnames of Ireland*, Irish Academic Press, Dublin Ireland.

³ O’Donovan J (1843) *The Tribes and Customs of Hy-many, Commonly Called O’Kelly’s Country*.

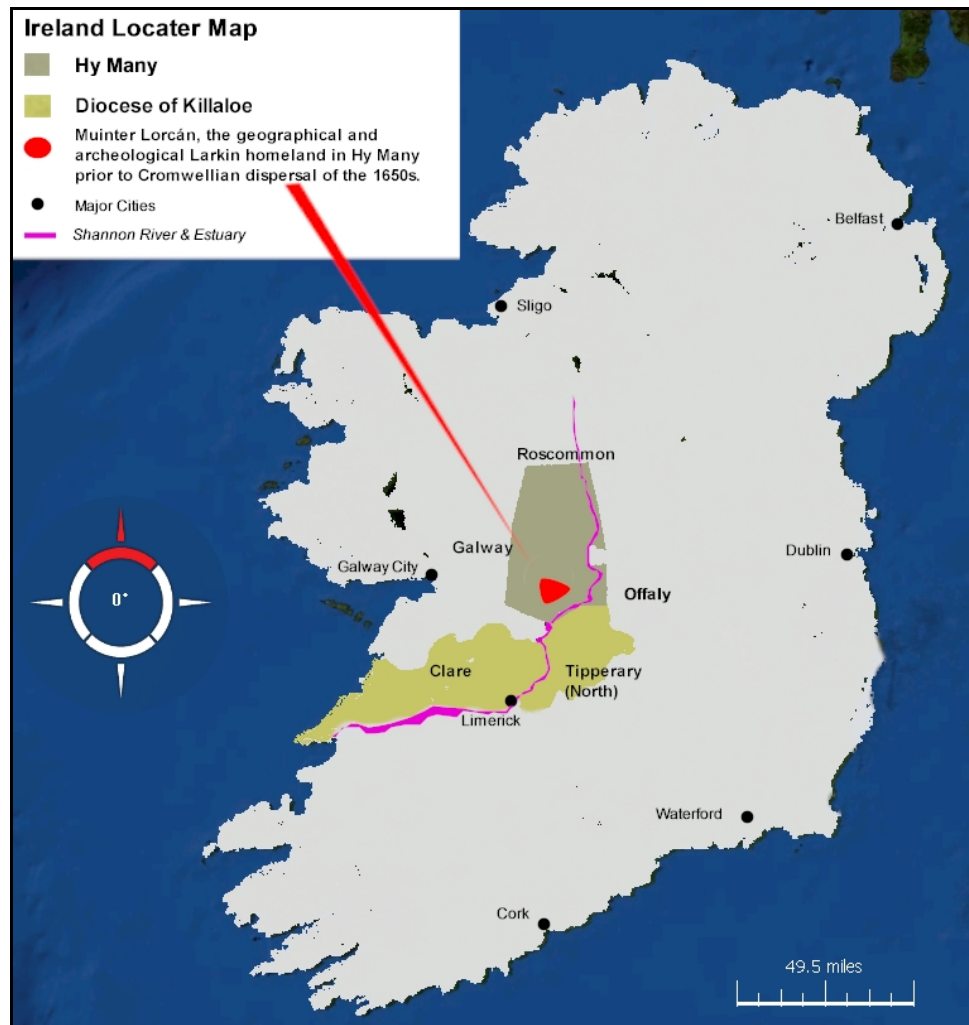


Figure 1: Location of Hy Many, Killaloe, and the Shannon River within Ireland (map created by the author with NASA World Wind (version 1.4.0.0) and Microsoft Image Composer (version 1.5) using satellite imagery in the public domain.)

son of Niall Noígíallach (Niall of the Nine Hostages).⁴ Niall was a very powerful king whose rule led to the wide adoption of Christianity in Ireland. Most importantly for genetic genealogy, a distinctive Y-STR signature has been identified and associated with Niall and his descendants.⁵ This signature has been labeled in various ways (e.g. *IMH*, *NWIrish*, *Str19*) but will be referred to as *R1b-M222* in this paper. For the Máine Mór descent from Niall to be true, the descendants of the

Hy Many region should be in the *R1b-M222* cluster.⁶ In turn, if Larkins from the Hy Many area are descended from Máine Mór as the annals state, they too should be in the *R1b-M222* cluster.

Muintir Lorcán

A particular focus for Hy Many Larkins is the area recorded as Muintir Lorcán, an old Gaelic term for

⁴ Larkin PB (2006) *Theories of Larkin Origins*, email to Brad Larkin. Also Walsh D (2003) *Background on Uí Maine*, <http://www.rootsweb.ancestry.com/~irlkik/ihm/uimaine.htm>. The descent of Máine Mór from Niall Noígíallach is specifically referenced to *An Leabhar Breac* - the Speckled Book of Duniry.

⁵ Moore LT, McEvoy B, Cape E, Simms K, Bradley DG (2006) A Y-Chromosome Signature of Hegemony in Gaelic Ireland. *The American Journal of Human Genetics*, Vol 78(2). www.ajhg.org.

⁶ Wilson D, McLaughlin JD (2009) *M222 Project Timeline*, <http://clanmaclochlainn.com/R1b1c7/timeline.htm>. Includes a good timeline on identification and research of the *R1b-M222* cluster and the disagreements about its probable time of origin (1,500 BCE to about CE 500).

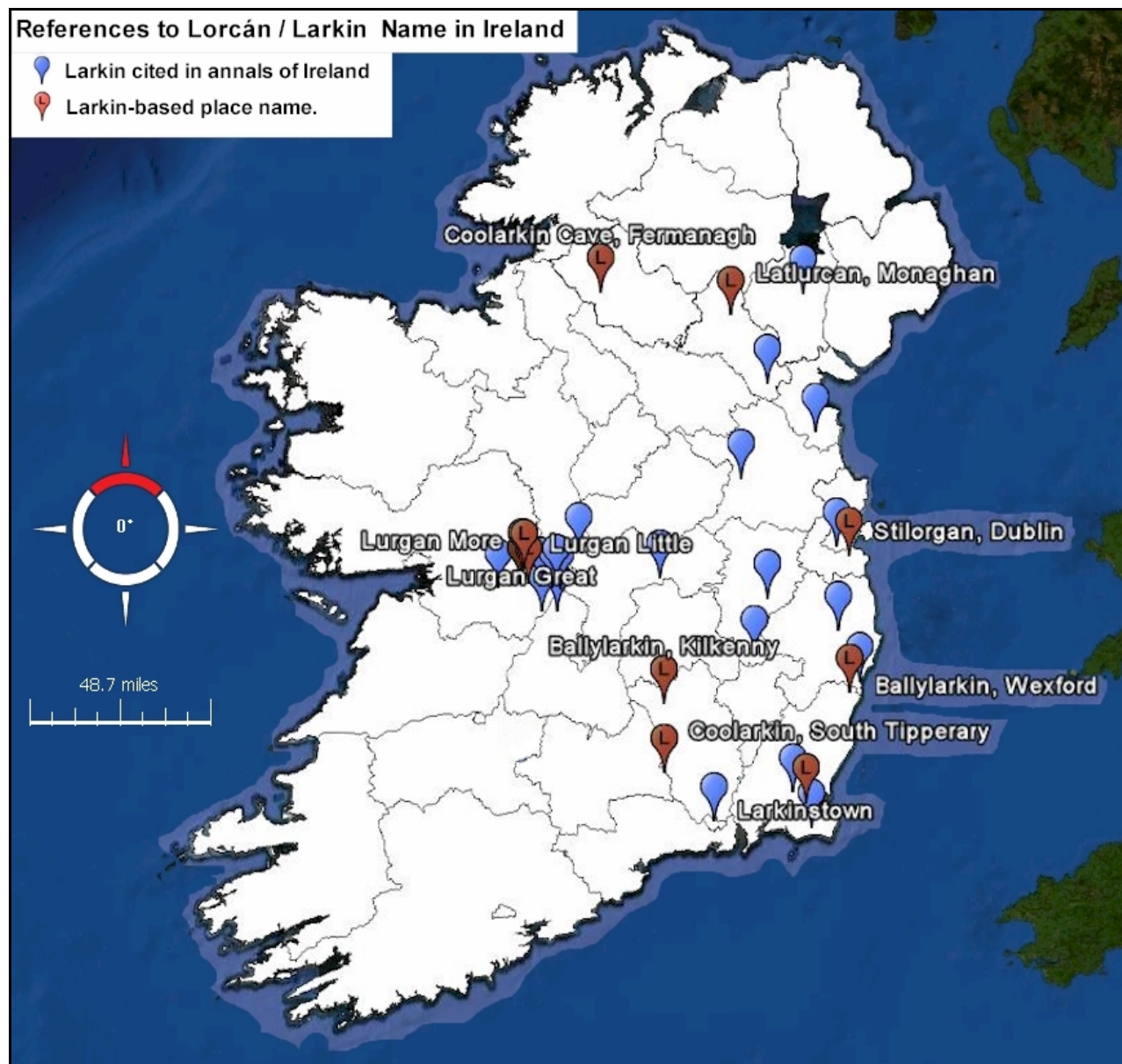


Figure 2: Annalist and Geographical Larkin References in Ireland. Larkin references drawn from Larkin DA (2009) *The Ancient Septs of ÓLorcain*. Queensland, Australia).

‘community of Larkin families’. Muintir Lorcán encompassed the land between the towns of Kiltormer, Laurecetown, and Killimor in County Galway as illustrated in Figure 3. Clan chieftain Patrick B. Larkin describes this area as the geographical and archeological Larkin homeland in Hy Many prior to the Cromwellian dispersal of the 1650s. In the present day, there are numerous townlands with names derived from Lorcán in this area including: Lurgan, Lurgan Great, Lurgan Little, Lurgan More, and Lurganshanny. Historically there are numerous Larkin property records and references to this area.

18-JUN-1585

MONTER LORKAN – all lands and heriditaments in Shillanghye as part of the nation of Donall O Madden of Longford [Barony, County Galway]. Granted to be held forever by the service of one knights fee for a rental of £80.00; and to provide 6 horsemen and 24 footmen to the service of the President of Connacht or the Lord Deputy.⁷

⁷ Larkin PB (2009) *Muintir Lorcán* presentation at Larkin Clan Gathering, Portumna, County Galway. Cites Larkin pardons and real

A physical inspection of Muintir Lorcán shows many archeological features such as the Ring Fort pictured in Figure 4. These sites could yield artifacts and ancient DNA for future study

Annalistic Accounts of the Dal Cais Tribe

In the 9th and 10th centuries CE, Ireland suffered a great number of internecine conflicts and Viking raids. A tribe known as the Dal Cais with a king named Lorcán gained control over the Kingdom of Thomond,

immediately south of Hy Many. Ultimately Lorcán’s grandson, Brian Boru, assembled a very powerful kingdom culminating in the Battle of Clontarf in CE 1014. Though he died in the battle, Brian Boru became a legend and his O’Brien dynasty held great influence for centuries. Traditional accounts attribute the Larkin Sept of Tipperary to be descended from the Dalcassians⁸ whose territory spanned the Shannon River and corresponded to the 19th century church diocese of Killaloe (Figure 1).⁹



Figure 3: Satellite Image of Muintir Lorcán in County Galway

estate in *Fiant Litterae Patentes*. Reference # 4718 is specifically the Muintir Lorcán transaction wherein the land was submitted to the crown and re-granted in CE 1585. This record appears in the *Fifteenth Report of the Deputy Keeper of the Records in Ireland* (1883).

⁸ Larkin DA (2000) *The Ancient Septs of ÓLorcain*, pp. 84-86.

⁹ Breen M (1910) Killaloe. *The Catholic Encyclopedia*. Robert Appleton Company, New York. Retrieved 2009 from New Advent: <http://www.newadvent.org/cathen/08641a.htm>.



Figure 4: Photograph of one of the many Ring Forts in Muintir Lorcán (Photo by author (2009) in Skenageehy Townland, Kiltormer, County Galway. Research by PB Larkin suggests this land was owned by Denis Lorcan on his death in 1733.)

Analysis

Datasets Utilized

Data Sources

Analysis was performed using the Y-STR DNA results of men who had complete FTDNA¹⁰ 37-marker test sets with a focus on haplogroup R1b as summarized in Table 1. The detailed Y-STR results are provided in a [data file attachment](#) and a summary by surnames is provided in *Appendix A*.

Sampling Considerations

As sampling was done through a combination of self-selection and recruitment of volunteers in a variety of circumstances, care has been taken for sampling effects where they might affect the findings. Specific considerations include:

- Using the modern telephone directory as a sampling frame, we have sampled approximately 2.1% of the Y-DNA Larkin population of The Republic of Ireland through 2009. See Table 11 and *Eircom Telephone Directory* in the appendices for more information on the distribution of participants and the Larkin population within Ireland.
- For the samples collected in 2009 in Ireland, there is an obvious sample bias towards persons who lived in proximity to the Larkin Clan Gathering event and the Shannon River versus the wider Larkin population of Ireland. Care for this bias has been taken when interpreting Larkin distributions around the world.
- As the focus of this study is on ancestral parishes in the Shannon River region, Larkin men with known non-parental events (NPEs) were excluded from the ancestral parish analysis and the Larkin Ancestry dataset. These samples were considered, however, as part of the global distribution of the surname and incidence of NPEs.

¹⁰ FTDNA is an abbreviation for Family Tree DNA, a provider of genealogical DNA testing in Houston, Texas. <http://www.familytreedna.com>.

Dataset	# of Records	Description
Larkin Ancestry	32	Records in the Larkin DNA Project with 37-marker test sets and who have Larkin Ancestry in the year CE 1800 to the best of their knowledge. Individual records are labeled L-XX in the tables and figures.
Hy Many Surnames	80	Public data sources with 37-marker test sets for men with surnames and a likely heritage from the Hy Many region. These records expose the level of uniqueness which Larkin results might have within the Hy Many area. In a broad sense, they could inform the question of how consistently surnames have followed gene flow in a fairly small geographical region. These records are labeled as surname, dash, and then id from the data source. Data sources included the Egan DNA Project ^a , the Kelly DNA Project ^b , and YSearch.org. ^c
McEwan Str19	40	John McEwan's Str19 (analogous to R1b-M222) records which he obtained from YSearch.org ^d . These records expose variance within the R1b-M222 cluster and how Larkin results might be related to other R1b-M222s throughout Ireland or Scotland and not just in Hy Many. These records are labeled as surname, underscore character, and then YSearch.org id.
McEwan Reference	49	R1b subclade modal haplotypes identified by John McEwan (excluding Str19). These were used to see if any Larkin samples matched an already identified clade.
Reference	5	Modal haplotypes for major R1b clades found in Ireland. Helps center phylogenetic networks.

Table 1: R1b Dataset Descriptions

^a Egan, S (2009) *Egan DNA Project*. <http://www.familytreedna.com/public/ClanEgan>.

^b Kelly R (2009) *Kelly DNA Project*. <http://freepages.genealogy.rootsweb.ancestry.com/~kellydnaproject/TestResultsTable.htm>.

^c YSearch.org org www.ysearch.org. Records used had to have complete FTDNA 37 marker set and ancestral origin of Ireland.

^d McEwan J (2007) *Dal Riadic Migration Y Chromosome DNA Genealogy Page*. <http://mcewanjc.org>

- Larkin DNA Project participants who lived outside of Ireland but who knew their ancestry at the parish level were associated with the appropriate parish in the maps produced with this paper.
- Where multiple project participants are known to have a common, identified genealogical ancestor, their data was reduced to a single data point in mapping and geographical plots. These known relations were valuable for directly measuring Y-STR mutation rates.
- Although some Y-STR haplotypes had only one sample with Larkin Ancestry, these haplotypes were treated as a 'group' for analysis because many future participants from around the globe may match these haplotypes due to the historical diasporas associated with Ireland.¹¹

¹¹ Wikipedia (2010) *Irish diaspora* http://en.wikipedia.org/wiki/Irish_diaspora. Includes an estimate that

Y-STR Results

Thanks to the many participants and facilitators, the Larkin DNA Project entered the year 2010 with twenty-two (22) samples with Irish ancestral parishes identified.

Summary By Haplogroup

The vast majority (90%) of all Larkin DNA project participants are part of Y Haplogroup R1b. All of the samples collected in Ireland in 2009 were R1b. Of the thirty-four (34) men with Larkin Ancestry and 37-marker Y-STR test results, 32 of 34 were in R1b with a strong concentration (19 samples or 56%) in R1b-M222 which is associated with Niall of the Nine Hostages (Figure 5).¹²

80 million persons worldwide have Irish ancestry versus a population for the island of approximately 6.2 million.

¹² Moore LT, McEvoy B, Cape E, Simms K, Bradley DG (2006) A Y-Chromosome Signature of Hegemony in Gaelic Ireland. *The American Journal of Human Genetics*, Vol 78(2). www.ajhg.org.

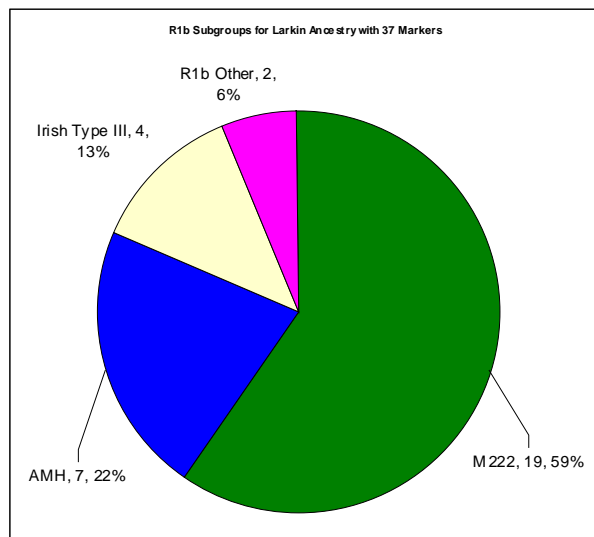


Figure 5: R1b Subgroups for Larkin Ancestry

Summary by Type and Ancestral County

The 37-marker R1b results have been classified into fourteen (14) Y-STR types (Table 2) across four (4) R1b subgroups (Figure 5). These types have been analyzed and compared using a number of approaches:

- ancestral geography
- estimates of time to the most recent common patrilineal ancestor (TMRCA) using relative correlation coefficients of the Y-STR values among participants (RCC)
- phylogenetic network analysis
- TMRCA based on generally accepted Y-STR mutation rates
- TMRCA based on Y-STR mutation rates observed in participants with known genealogy relationships

Table 2 cross references the Y-STR Type with the ancestral county of the participants.

TMRCA Based on Correlation Coefficient Analysis

In order to separate haplotypes into groups for analysis and to estimate TMRCA, some of the correlation techniques developed by William E. Howard III were used to analyze the R1b dataset and produce RCC values.¹³

¹³ Howard WE III (2009) The Use of Correlation Techniques for the Analysis of Pairs of Y-STR Haplotypes, Part 1: Rationale, Methodology and Genealogy Time Scale. *Journal of Genetic Genealogy*, 5(2):256-270.

The TMRCA of the identified Larkin Types is shown in Table 3 based on Howard’s factor of 43.3 years per RCC unit. This approach indicated a TMRCA of about 550 years for the two largest groups of Larkin men, Types 1 and 2. The intercluster region of Types 1-2 indicates when the common ancestor between both types was born and was calculated as 1,862 years ago.

Phylogenetic Network Analysis

A phylogenetic network was constructed with a median-joining tree using Fluxus’ *Network* software to visualize patterns and potential relationships in the R1b datasets. Figure 6 illustrates the entire network and shows the distinct nature of the R1b-M222 cluster.

Within the R1b-M222 Cluster shown in Figure 7 we see two predominant Larkin types labeled Types 1 and Type 2. These types share many markers with other Hy Many surnames yet are also fairly distinct from men with other surnames. There were 2 Larkin men identified as R1b-M222 who were not close to Types 1 and 2. These have been identified as Type 3 and Type 4 in Figure 7.

Type	Haplogroup Subgroup	Galway	Tipperary North	Offaly	Clare	Tipperary South	Kerry	Laois	Wexford	Other Ireland	British Isles	Unknown	Totals
Type 1	R1b-M222	4	6									1	11
Type 2	R1b-M222	3		2						1			6
Type 3	R1b-M222	1											1
Type 4	R1b-M222	1											1
Type 5	R1b-AMH										2		2
Type 6	R1b-AMH										2		2
Type 7	R1b-AMH		1		1								2
Type 13	R1b-AMH									1			1
Type 9	R1b-Irish Type III						1						1
Type 10	R1b-Irish Type III									1			1
Type 11	R1b-Irish Type III							1					1
Type 12	R1b-Irish Type III								1				1
Type 8	R1b Other	1											1
Type 14	R1b Other					1							1
-	R1a										1		1
-	II									1			1
	Totals	10	7	2	1	1	1	1	1	4	4	1	34

Table 2: Number of Results by Y-STR Cluster and Geography

	Type 1	Type 2	Type 3	Type 5	Type 6	Type 7
Type 1	521	1,862	1,957	1,863	2,913	3,886
Type 2	1,856	563	1,522	1,982	2,768	2,227
Type 3	1,957	1,525	1,159	2,325	2,309	2,577
Type 5	1,868	1,982	2,337	1,223	2,163	2,591
Type 6	2,887	2,768	2,324	2,163	114	2,760
Type 7	3,693	2,227	2,581	2,591	2,760	640

Table 3: TMRCA (Yrs) For Selected R1b Larkin Groups Using RCC Analysis

Analysis of Types 1 and 2

Geographical Analysis of Types 1 and 2

Table 4: Characteristics of R1b-M222 Larkin Types
Figure 8 shows a phylogenetic tree isolated for Types 1 and 2 with color-coding for the ancestral county of each

man. Here we see that the samples come from Galway, Tipperary, and Offaly in no distinct cluster. Thus, it seems highly likely that the Larkin surname has spread from a common source and been dispersed throughout the Shannon river area. R1b-M222 Larkin men from Galway are as likely to be closely related to those from Tipperary as they are to others in Galway.

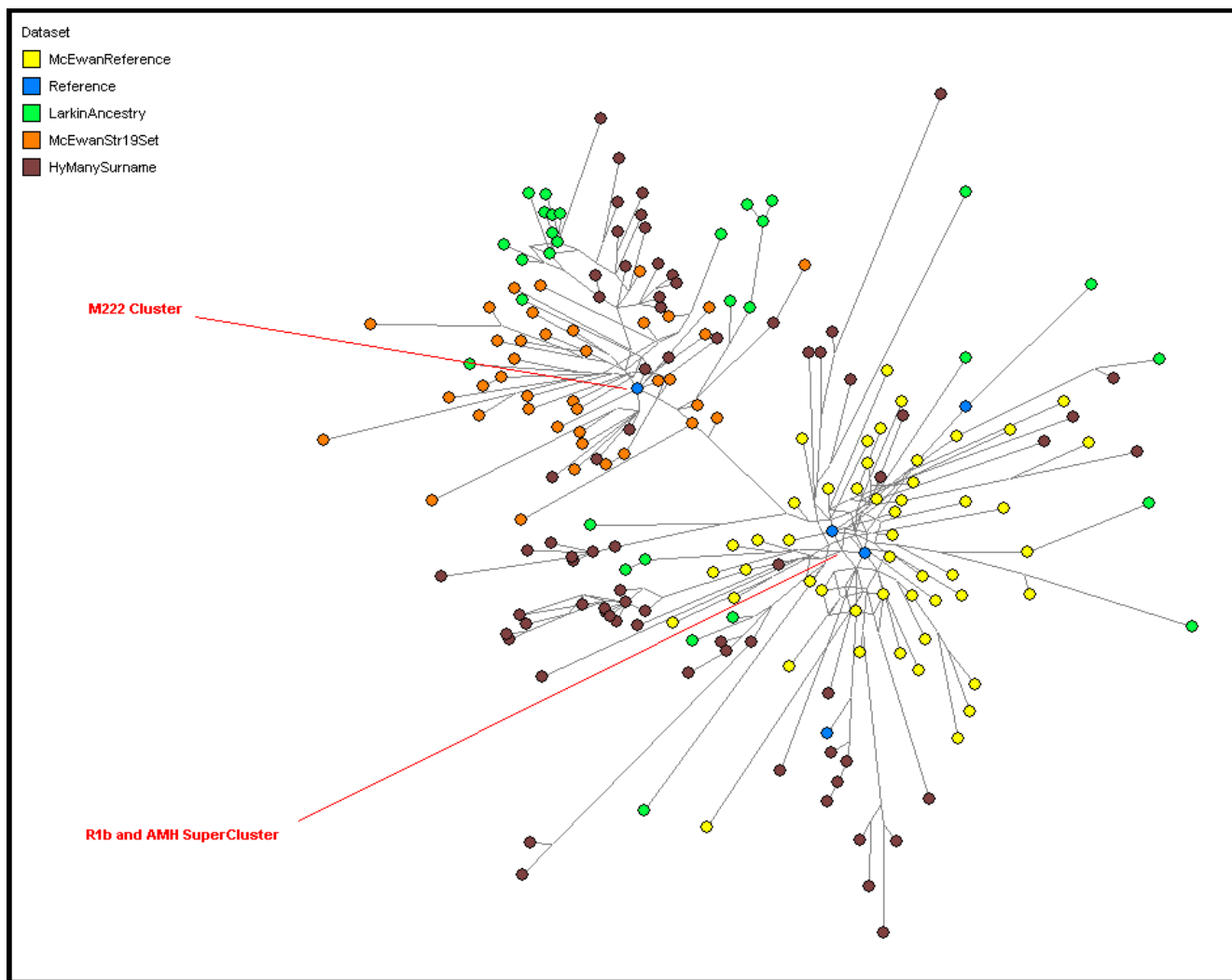


Figure 6: Phylogenetic Network of R1b Datasets (Fluxus Network software 4.5.1.0 median-joining network with $\epsilon = 0$. See data file for Y-STR marker weights. See www.fluxus-engineering.com which references Bandelt H-J, Forster P, Röhl A (1999) Median-joining networks for inferring intraspecific phylogenies. *Mol Biol Evol* 16:37-48.)

Tests for Common or Distinct Ancestors – Other Surname Matches for Types 1 and 2

If these Type 1 and Type 2 Larkin men shared a single common ancestor in Hy Many prior to the 11th century CE, we would expect to see a diverse tree today. In terms of Figure 8, these might be men with the Larkin surname whose Y-DNA results would produce branches off the Type 2 tree. Conversely, if the Larkin surname was simply adopted by many men with different paternal lineages in the Hy Many area, we might expect the men of Types 1 and 2 to have many close matches from men with other surnames – especially surnames associated with Hy Many.

While the Hy Many surname dataset used for analysis here gives some indication of other surnames, a much larger database can be employed by using the matching tools on the individual results pages at FTDNA. Although the exact STR allele values are not available from this source, the number of matches and their surnames can be viewed. Analysis with this approach indicated that 14 of the 17 samples in Types 1 and 2 had no 34/37 or higher matches with other surnames at FTDNA. The remaining three samples each a person with another surname. Thus, the DNA information collected to date supports the annalistic accounts that Larkin Types 1 and 2 have a paternal heritage distinct from other surnames since approximately the 10th century.

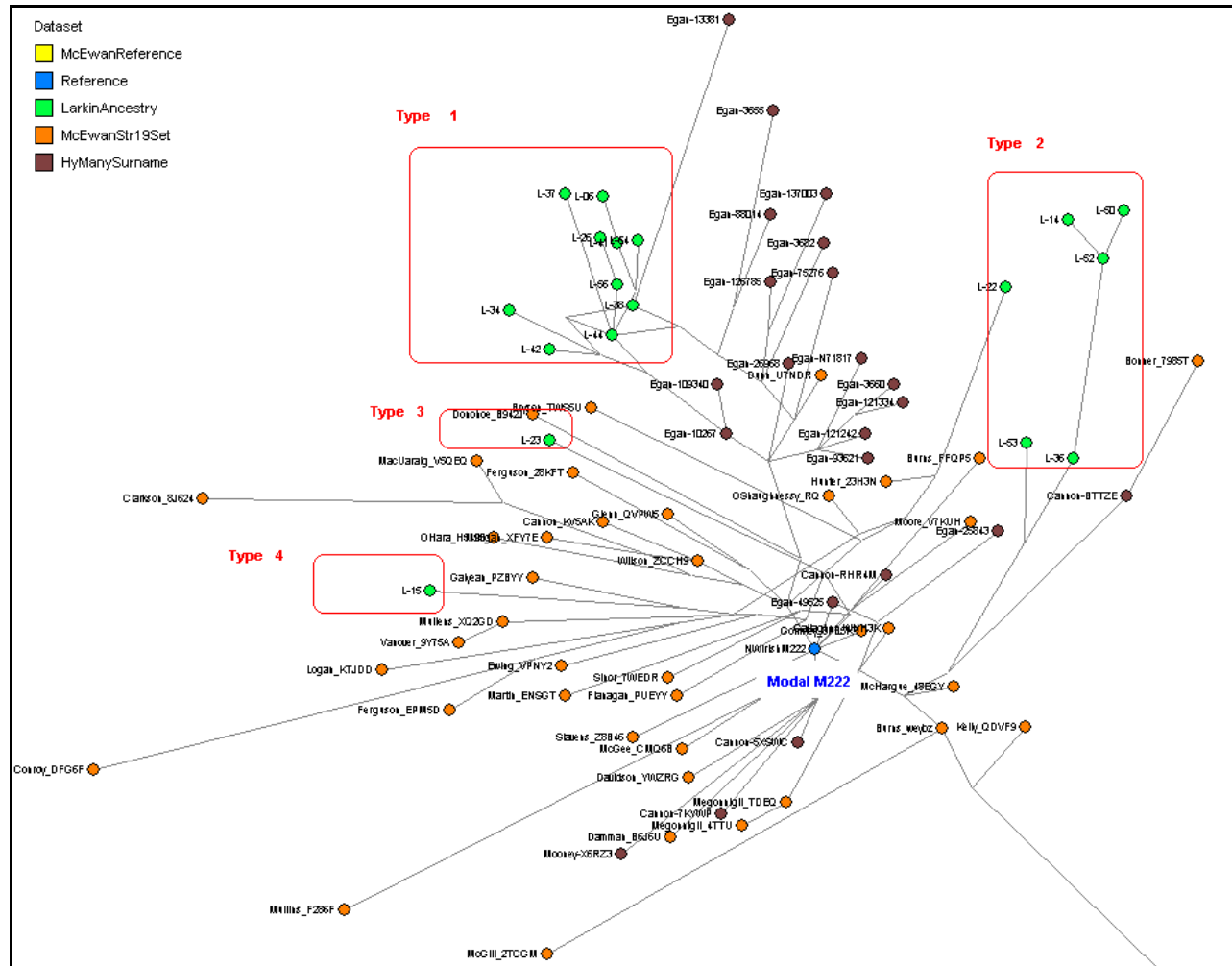


Figure 7: R1b-M222 Cluster Analysis for Larkin Types within R1b Dataset

M222 Larkin Types		All: DYS 390 = 25, 26; DYS 19 = 14
Designation	# Identified	Distinguishing STR Markers & Comments
Type 1	11	DYS 385b = 14; DYS 464b = 15; DYS 449 = 27; DYS 576 = 17 Most common haplotype in North Tipperary and East Galway area around the Shannon River. Ancestral parishes include: Lorrha, Dorrha, Knigh, & Aghnameadle in Co Tipperary; Clonfert, Tynagh, & Loughrea in County Galway. Participant IDs: L-06, L-26, L-34, L-37, L-38, L-41, L-42, L-44, L-51, L-56, L-64
Type 2	6	DYS 460 = 12; DYS 458 = 18; DYS 449 = 29 Includes Kiltormer Larkins from around Aughrim area of Galway as well as the Lusmagh and Coolderry Larkins of County Offaly. Ancestral parishes include Etagh & Lusmagh in County Offaly; Killimorbologue, Killallaghtan & Clonfert in County Galway. Participant IDs: L-14, L-22, L-36, L-50, L-52, L-53
Type 3	1	DYS 458 = 18; DYS 449 = 30; DYS 576 = 17 Haplotype is very close to R1b-M222 modal. Family origin is American immigrant from County Galway but no ancestral parish identified. Participant ID: L-23
Type 4	1	DYS 459b = 11; DYS 391 = 10; DYS 389-1 = 14. County Galway origins but no ancestral parish identified. Participant ID: L-15

Table 4: Characteristics of R1b-M222 Larkin Types

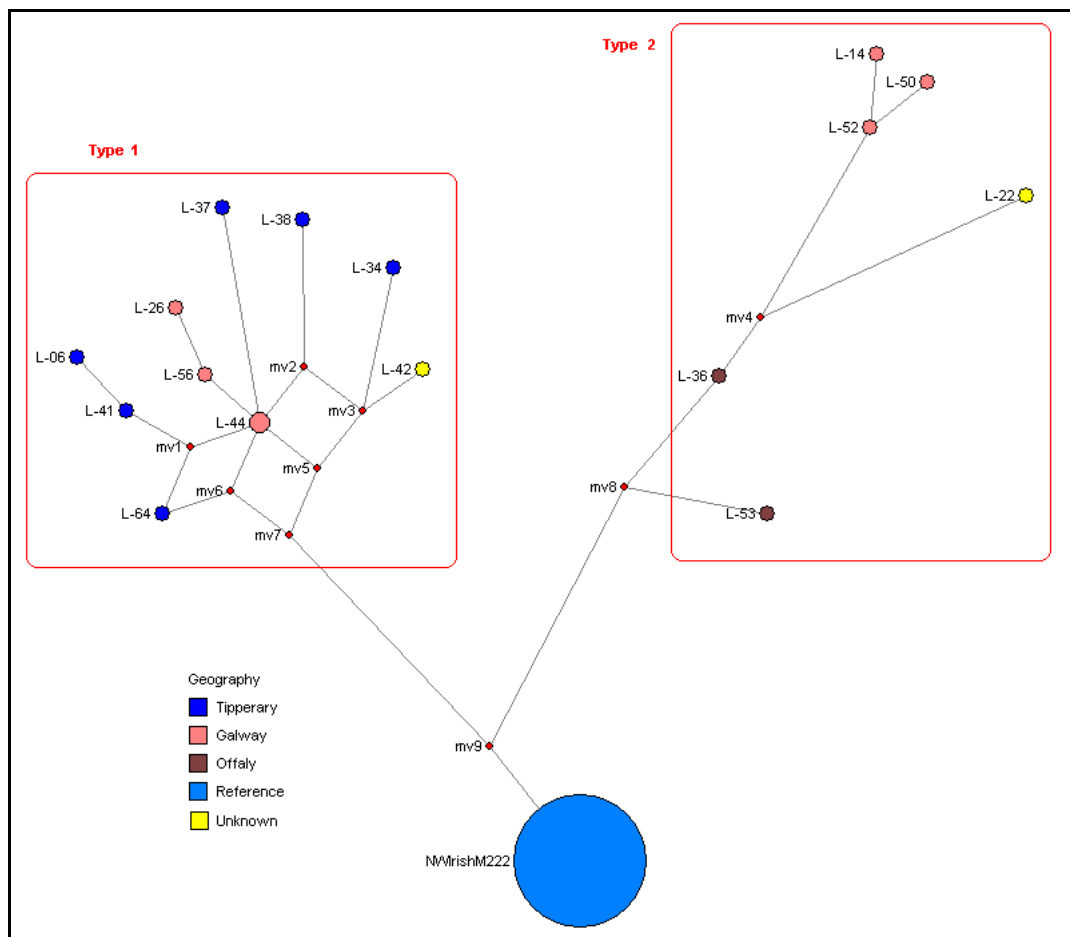


Figure 8: Phylogenetic Network of Larkin Types 1 and 2 with Ancestral County Color-Coding

Prevalence of Larkin Types 1 and 2 in Worldwide Larkin Population

To consider the worldwide population of men with the Larkin surname, we need to adjust our Y-STR analysis to include persons with known non-paternity events (NPEs) and exclude men who do not have the Larkin surname or its immediate variants. To avoid sampling bias, we should also discard the results obtained through Ancestral Parish Sampling and other recruitment efforts. In this context, Types 1 and 2 combined comprised 20% of all the Larkin men worldwide in the Project. This finding suggests that the Larkin patriarch of Types 1 and 2 was probably the patrilineal ancestor of about 1 in 5 of all men today who have the Larkin surname.

Analysis of Other R1b Types

Figure 9 is a phylogenetic network plot of R1b results which are not in the R1b-M222 cluster. Most of these results are part of the Atlantic Modal Haplotype super

group (AMH).¹⁴ Table 5 lists the ten types that were defined for men with Larkin ancestry.

TMRCAs Based on STR Mutation Rates

FTDNA Mutation Rates

To provide another perspective on the degree of relatedness of the R1b Larkin men, a TMRCA analysis was performed using sample L-44 from Type 1 as a focal point with Y-STR mutation rates derived from FTDNA and other published data.¹⁵ These TMRCA values are displayed in Table 6.

¹⁴ Wikipedia (2009) *Atlantic Modal Haplotype*. http://en.wikipedia.org/wiki/Atlantic_Modal_Haplotype.

¹⁵ Walsh B (2001) Estimating the Time to the Most Recent Common Ancestor for the Y chromosome or Mitochondrial DNA for a Pair of Individuals. *Genetics* 158, p. 897-912.

Designation	# Identified	Distinguishing STR Markers & Comments
Type 5	2	DYS 447 = 24; DYS 442 = 13 Near McEwan's STR22 Frisian cluster. Members with known ancestry trace to British Isles. Includes descendant of Larkin Soap Company founder John Durant Larkin of Buffalo, NY. Ancestral parishes include Beckley, Sussex County, England. Participant IDs: L-05, L35
Type 6	2	DYS 437 = 14; DYS 460 = 10; American colonial ancestry but no ancestral parishes have been identified. Participant IDs: L-27, L-28
Type 7	2	DYS 391=10; DYS 458 = 18, 19; Ancestral parishes are Kilsely in County Clare and Templetohy in County Tipperary. Also matches a number of men with the Kelly surname. The geography for this group suggests a Dalcassian origin but their haplotypes are not consistent with the Irish Type III cluster. Participant IDs: L-39, L-58
Type 8	1	DYS 19 = 15; DYS 389-1 = 12 Close to the R1b Str47 cluster identified by McEwan. Could be descended from a Gallowglas named McLarkan from the Gort area. Ancestral parishes of Fahy and Kilmacduagh in County Galway. Participant ID: L-40 (also L-07 who does not have a 37-marker test).
Type 9	1	DYS 447 = 25; DYS 464b = 15; DYS CDY a-b = 37-39 Haplotype appears to be part of the Irish Type III cluster identified by Ken Nordtved ^a . Ancestral parish is Killarney in County Kerry. Participant ID: L-31
Type 10	1	DYS 392 = 13; DYS 459a = 9; DYS 439 = 13. Irish Type III. Origin story is of American immigrant from Dublin. No ancestral parishes identified. Participant ID: L-07
Type 11	1	DYS 447 = 23; DYS 464c = 13 Part of Irish Type III cluster. Ancestral parish is Borris (Portlaoise) in County Laois. Participant ID: L-47
Type 12	1	DYS 390 = 25; DYS 392 = 30, DYS 458 = 16 Likely part of the Irish Type III cluster. Ancestral parish is Owenduff in County Wexford. Participant ID: L-59
Type 13	1	DYS 390 = 23; YCA IIb = 22; DYS 607 = 14 American immigrant from Ireland to Rochester, New York. No ancestral parish identified. Participant ID: L-32
Type 14	1	R1b but not from AMH cluster. DYS 390 = 21; YCA IIa = 22; DYS 449 = 30; DYS 437 = 16 Ancestral parish is Kilsheelan in County Tipperary (South). Participant ID: L-60

Table 5: Characteristics of Non-R1b-M222 Larkin Types

^aWright D (2009) *Irish Type III Home Page*. <http://www.irishtype3dna.org>. Also Nordtvedt K (2006) *More on an Irish 24/10 R1b Variety; S21+?* <http://archiver.rootsweb.ancestry.com/th/read/GENEALOGY-DNA/2006-02/1140279345>

Even with the higher mutation rate estimate and the relaxed 50% probability level, the actual value of TMRCA (measured from birth of common ancestor to birth of youngest relation) was significantly less than that forecast by the estimation tools for Types 1 and 2 as shown in Figure 10.

Analysis by Ancestral Parish

Twenty-two (22) of the 37-marker samples were linked to eighteen (18) distinct Irish parishes. One sample has been linked to a parish in England. Figure 11 plots the ancestral parishes of participants around the Shannon

Type	ID	TMRC A to L-44 (Yrs)		Type	ID	TMRC A to L-44 (Yrs)
Type 1	L-51	60		Type 5	L-35	930
Type 1	L-56	120		Type 2	L-50	930
Type 1	L-26	210		Type 4	L-19	960
Type 1	L-41	210		Type 2	L-52	1050
Type 1	L-64	210		Type 2	L-14	1140
Type 1	L-06	300		Type 9	L-31	1140
Type 1	L-37	300		Type 12	L-59	1140
Type 1	L-38	300		Type 6	L-27	1260
Type 1	L-42	300		Type 7	L-39	1260
Type 1	L-34	360		Type 7	L-58	1260
Type 2	L-22	720		Type 14	L-60	1260
Type 3	L-23	720		Type 6	L-28	1380
Type 2	L-36	720		Type 13	L-32	1380
Type 2	L-53	840		Type 10	L-07	1500
Type 5	L-05	930		Type 11	L-47	1770
Type 4	L-15	930		Type 8	L-40	2070

Table 6: TMRC A Estimates for L-44 (Type 1) Using FTDNA Mutation Rates (TMRC A estimates made by the author using the *Y-DNA Comparison Utility* by McGee D (2009) <http://www.mymcgee.com/tools/yutility.html>. This set done with FTDNA mutation rates and 50% probability level, 30 years per generation, infinite allele model.)

Type	ID	TMRC A to L-50 (Yrs)		Type	ID	TMRC A to L-50 (Yrs)
Type 2	L-52	120		Type 2	L-22	450
Type 2	L-14	210		Type 2	L-53	630
Type 2	L-36	360				

Table 7: TMRC A Estimates for L-50 (Type 2) Using FTDNA Mutation Rates (*Y-DNA Comparison Utility*. FTDNA mutation rates, 50% probability level, 30 years per generation, infinite allele model.)

Y-STR Type	Relationships	MRCA (Generations)	TMRC A (Yrs)	Y-STR Marker s Tested	Number of Y-STR Mutation s	Transmission Events	Total Mutation Opportunitie s	Observed Mutation Rate
Set 1, Type 1	L-64 and L-41 are 3rd cousins, L-06 and L-41 are 2nd cousins once removed.	5	169	37	2	12	444	0.00450
Set 2, Type 2	L-14 and L-52 are 1st cousins	2	87	37	1	4	148	0.00676
Set 3, Type 6	L-27 and L-28 are 8th cousins	9	275	67	1	18	1,206	0.00083

Table 8: Observed Mutation Rates in Men with Known Genealogical Relationships

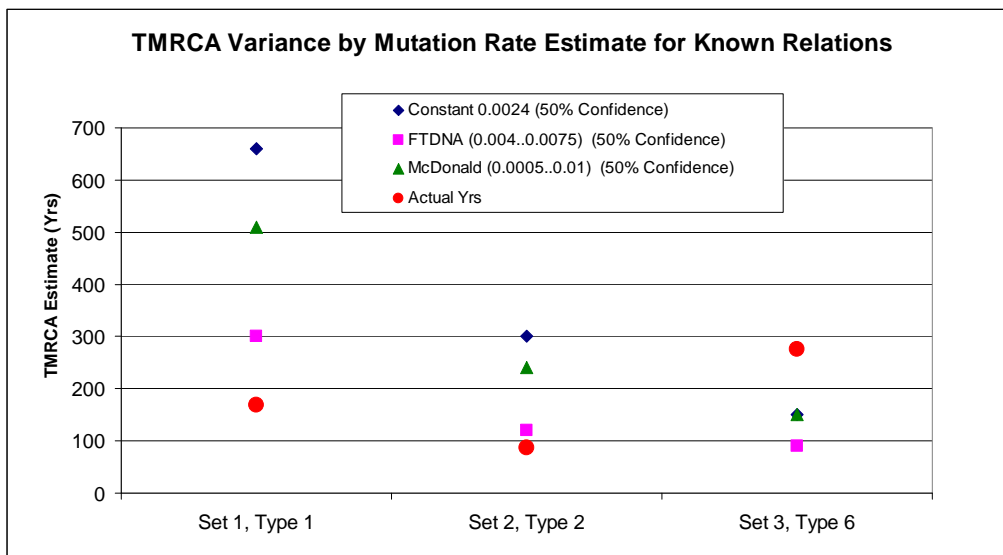


Figure 10: TMRCA Estimation Variance by Mutation Rate Set for Known Relations

River with an overlay of Muintir Lorcán, Hy Many, and Killaloe. The results indicate that members of Types 1, 2, and 7 lived on both sides of the Shannon around CE 1800.

Conclusions

With the finding that Types 1 and 2 are both part of the R1b-M222 cluster and are most common in the Hy Many area, I conclude that they are highly likely to have been part of the same medieval Gaelic clan of Muintir Lorcán in Hy Many. The strong degree of relatedness of Larkin men with origins on both sides of the Shannon River in the area where counties Galway, Offaly, and Tipperary meet suggests that these men do share a common origin and should be considered as a single sept -- contrary to the theories of the 19th and 20th century genealogy writers.

Y-STR Type	RCC Method (Yrs)	FTDNA Mutation Rates (Yrs)	Avg Observed Mutation Rates (Yrs)
Type 1	521	360	540
Type 2	563	630	630
Type 1-2	1,862	1,140	1,470

Table 9: Comparison of Several Methods for TMRCA for Types 1 and 2

The exact era of this common Hy Many ancestor cannot be precisely determined at present due to the economic

and technological limitations on complete Y-chromosome sequencing. The broader debate over the age of the M222 SNP¹⁷ also complicates an exact dating of the Hy Many Larkin progenitor.

Using the tools and technologies available with three different methodologies (Table 9) the best estimate for the time of the Hy Many Larkin patriarch is probably about 540 CE which is consistent with annalistic accounts of the founding of Hy Many along the Shannon River. With 59% of the R1b results being in the R1b-M222 cluster, the Larkin surname should be considered as part of the *Ui Niall* cadre in future Irish surname studies.

Further south with Type 7, we see a match between Larkins who are not R1b-M222 with ancestry on both sides of the Shannon River in Central Tipperary and Eastern County Clare. This finding supports the annalistic linkage of the Dalcassian clans of Brian Boru with Tipperary Larkins and the diocese of Killaloe – excluding the northern portions of Tipperary. This Type 7 group, however, does not match the Irish Type III signature recently proposed for Dalcassians.¹⁸

¹⁷ Wilson D, McLaughlin JD (2009) *M222 Project Timeline* <http://clanmaclochlainn.com/R1b1c7/timeline.htm>.

¹⁸ Wright DM (2009) A Set of Distinctive Marker Values Defines a Y-STR Signature for Gaelic Dalcassian Families. *Journal of Genetic Genealogy*, 5(1):1-7. <http://www.jogg.info/51/files/Wright.pdf>

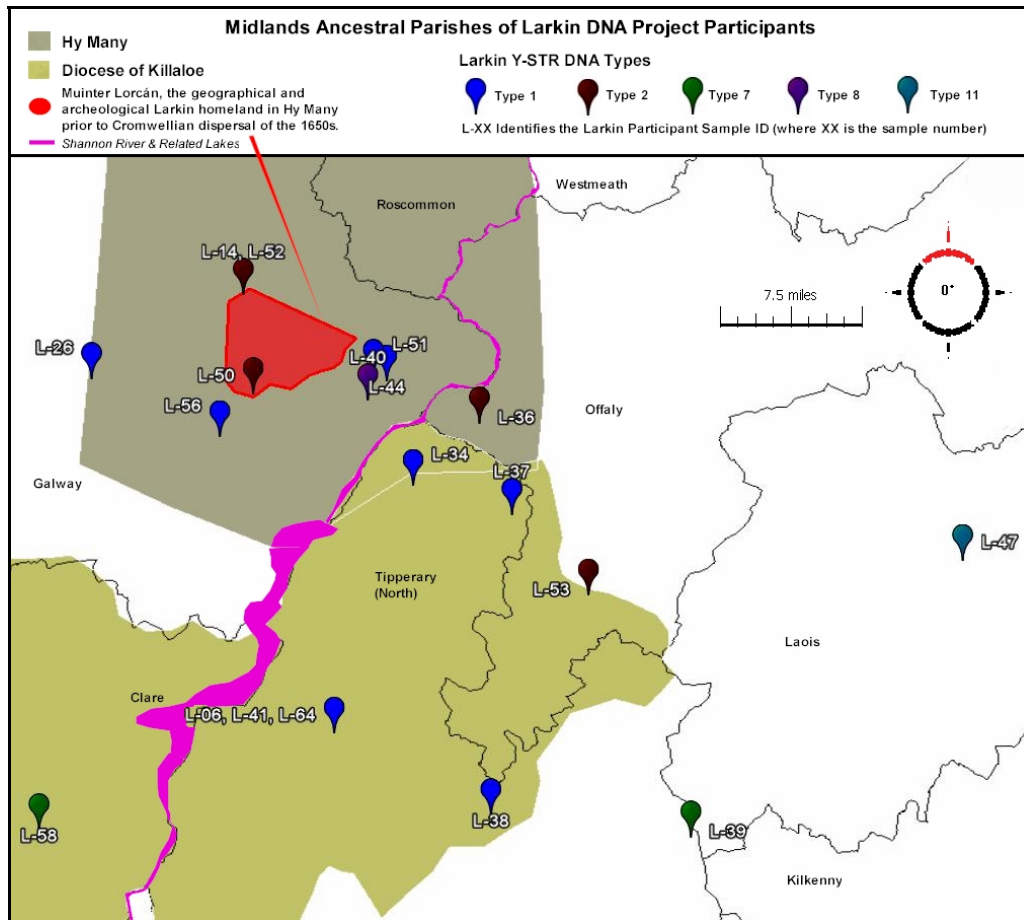


Figure 11: Ancestral Parishes of Participants Identified in the Midlands of Ireland (Map created by the author with NASA World Wind (version 1.4.0.0) and Microsoft Image Composer (version 1.5). Figure is portion of Ireland centered on 53.00731, -7.95830, 90,816m -roughly Birr, County Offaly, Ireland)

Areas for Further Research

With the Larkin surname having multiple origin accounts in Ireland as well as some instances from England and Germany, the Larkin DNA Project will continue to recruit participants and try to identify ancestral origins. In the broader context of genetic genealogy, continued research on the M222 SNP marker, full genomic sequencing, and development of techniques to sequence ancient DNA samples will improve our understanding of our genealogical relationship to Niall and each other.

Within Ireland, focus areas for sampling based on historical continuity should target Larkins living in the counties of Armagh, Kilkenny, Waterford, Wexford, and South Tipperary and around the cities of Athlone and Limerick.

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Appendix A Study Datasets

The core results contained in this paper are based on the 37-marker tests conducted as part of Larkin DNA Project. In order to create meaningful RCC and Phylogenetic Network analyses and provide Larkin results from a fairly small geography whose Y-STR results are dominated by R1b-M222 haplotypes, public datasets with the same 37 markers were combined with the Larkin data. Table 10 summarizes the surnames and number of records used from those datasets.

Surname Group	Larkin Ancestry	Hy Many Surname	McEwan Str19Set	McEwan Reference	Reference	Grand Total
Bonner			1			1
Bryson			1			1
Burns			2			2
Cannon		6	1			7
Clarkson			1			1
Coffey		14				14
Conroy			1			1
Damman			1			1
Davidson			1			1
Donohoe			1			1
Dooley		2				2
Dunn			1			1
Egan		40				40
Ewing			1			1
Ferguson			2			2
Flanagan			1			1
Gallagher			1			1
Galyean			1			1
Glenn			1			1
Gormley			1			1
Hunter			1			1
Kelly		11	1			12
Larkin	31					31
Logan			1			1
MacUraig			1			1
Madden		2				2
Martin			1			1
McCarty	1					1
McGee			1			1
McGill			1			1
McHargue			1			1
Megonnigil			3			3
Milligan			1			1
Mooney		1				1
Moore			1			1
Mullins			2			2
O'Hara			1			1
O'Shaughnessy			1			1
Sinor			1			1

Slavens			1			1
Tracy		4				4
Vanover			1			1
Wilson			1			1
(none)				49	5	54
Total	32	80	40	49	5	206

Table 10: Count of R1b Y-STR Records by Surname and Dataset

Nomenclature

In the accompanying data file, taxons *STRx* were part of the McEwan modals. Taxons labeled *L-xx* were from the Larkin DNA Project. Taxons with surname and the underscore character were from the IrishSTR19 (M222) group of John McEwan. Those with a surname and hyphen (e.g. *Coffee-DRMQ*) were from various surname DNA projects with Hy Many connections in the annals. The *Type* column indicates the classification given to that sample as part of the clustering analysis done for this paper. The DNA allele values correspond to FTDNA nomenclature except that DYS-389D is the difference between markers DYS389-II and DYS389-I.

See the [accompanying data file](#) for actual datasets, STR values, and other data.

Appendix B Larkin DNA Project – 2009 Statistics

Sample Accession

The first Larkin test at FTDNA labs occurred in February, 2005 and the surname project was started the following month. To protect the privacy of participants, results are generally presented with sample identification as "L-XX" where XX is an anonymous identification number within the project.

As of December 21, 2009, there were sixty-eight (68) tracking records in the Larkin surname project, however two (2) of these were for females and five (5) from men who do not have the Larkin surname. Of the sixty-one (61) men with the surname, seven (7) had not returned their test kits.

Table 11 summarizes the sample accession by year.

Of the fifty-four (54) sets of Y-STR results, five (5) have known non-parental events (NPE) or surname changes in recent history. For persons seeking genetic genealogy connections, there are forty-nine (49) men with Larkin ancestry who have test results which might give insight on the historical spread of the surname.

Year	Number of Results in Year	Cumulative Number
2005	4	4
2006	8	12
2007	10	22
2008	4	26
2009	28	54

Table 11: Larkin Project Y-STR Result Count by Year

Participant Locales

Prior to 2009, we had only one participant who resided in Ireland. Through the efforts of the Ancestral Sampling Effort, we closed 2009 with sixteen (16) Irish residents as illustrated in

Figure 12.

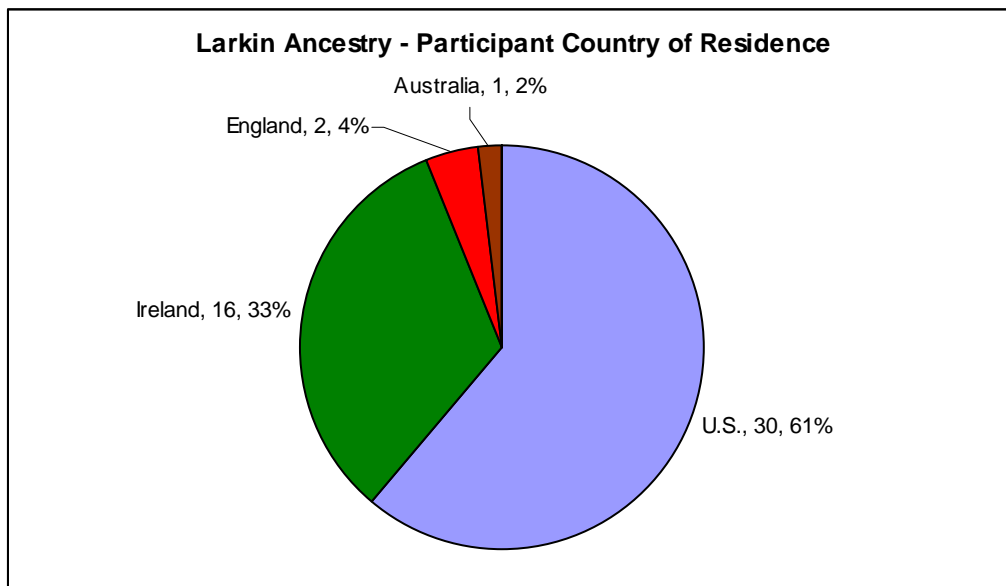


Figure 12: Country of Residence for Larkin DNA Project Participants

Haplogroups Identified

Figure 13 illustrates the haplogroup distribution of the forty-nine (49) men of Larkin Ancestry with Y-STR results (irregardless of how many markers were tested). Fourty-four (44) are in Haplogroup R1b, two (2) in Haplogroup R1a, two (2) in Haplogroup I, and one (1) in Haplogroup E. Note that two of these men do not have the Larkin surname but have been linked through genealogical connections.

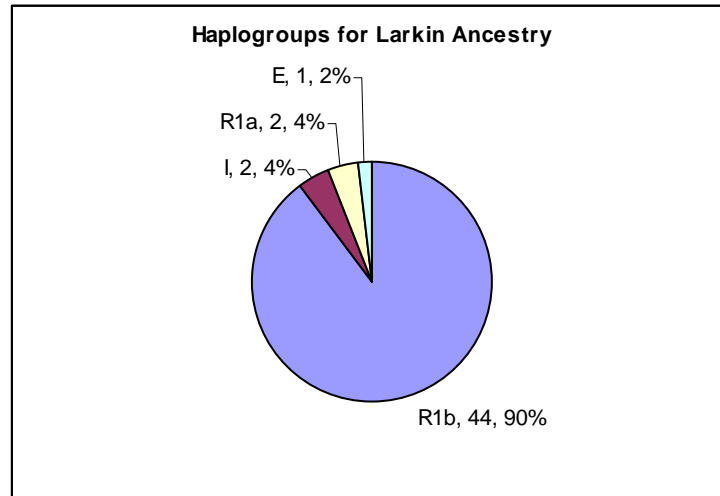


Figure 13: Haplogroups for Larkin Ancestry

Geographically, thirty-three (33) of these forty-nine (49) men have Irish origins, three (3) have English origins, five (5) are more broadly British Isles, and one (1) is of African-American descent.

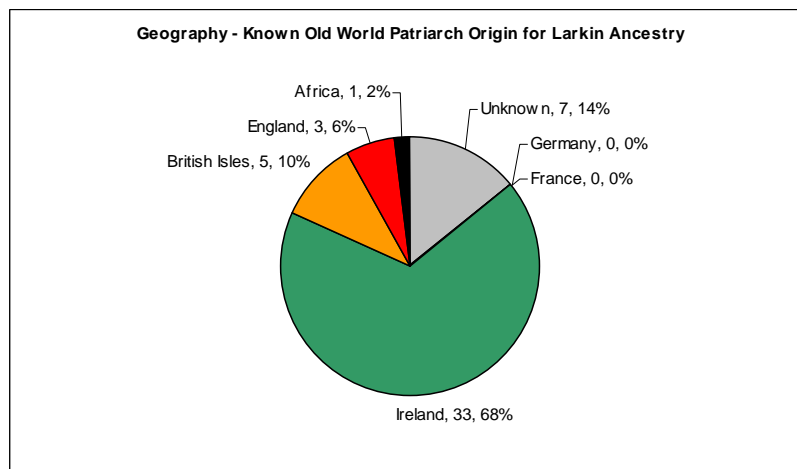


Figure 14: Old World Origin for Male Participants with Larkin Ancestry

Number of Markers Tested

Of the forty-nine (49) men with Larkin Ancestry and Y-STR results, only thirty-four (34) men have the complete 37-marker panel. Thirty-two (32) of those results are in Haplogroup R1b with one in Haplogroup I1 and one (1) in Haplogroup R1a. Of these samples, five (5) men have had the FTDNA 67-marker test performed.

SNP Markers Tested

Two (2) men with Larkin Ancestry have had R1b SNP subclade testing performed. One of those, L-06, has the M222+ marker and links Types 1 to 4 with the R1b-M222 subgroup of R1b.

Appendix C Ancestral Parish Target Identification

In order to help identify Larkin men living in Ireland today with strong ancestral roots in the area, an analysis was made of Irish civil parishes over several historical record sets.

Tithe Applotment Books

The Tithe Applotment Books are the earliest surviving historical record of households that covers all Irish counties. They were intended to form a basis for fees payable to the protestant Church of Ireland. A tithe ‘book’ was recorded for each parish between 1823 and 1838. Although the date and quality of the individual books can vary, these hand-written documents provide an important historical record of the heads of rural households in Ireland.¹⁹ Figure 15 provides an illustration of civil parishes with Larkin households found in the Tithe Applotment Books as well as markers for DNA Project participant ancestral parishes.

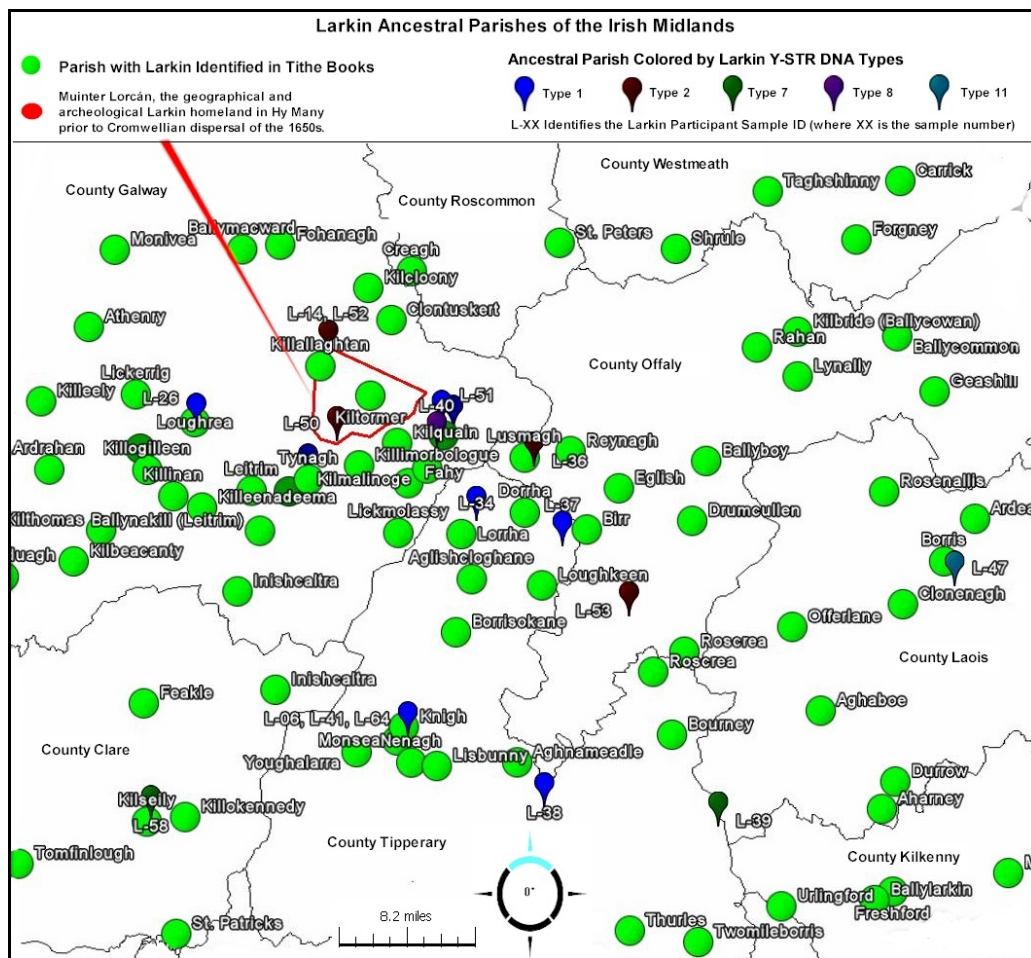


Figure 15: Larkin Ancestral Parishes in the Tithe Applotment Books of the early 19th Century²⁰

¹⁹ IrishTimes.com (2010) *Tithe Applotment Books*. <http://www.irishtimes.com/ancestor/browse/records/land/tiap.htm>

²⁰ Based on Applotment Book extractions made by the author as well as David Austin Larkin, and Patrick B Larkin. Best single source of information (although it does have errors) is *The Householders Index, An Index of Surnames of Householders in Griffith's Primary Valuation and Tithe Applotment Books*. 14 vols. Typescript. Dublin: National Library, 1960-70. (FHL book Ref 941.5 R22i 14 vols, film 919,001-7; computer number 0316279).

Griffith's Valuation

The survey known as Griffith's Valuation was a more comprehensive tax roll established after the Tithe program of the 1830s failed to generate the desired revenue and was strongly resisted in some locales. The records were completed between the years of 1847 and 1864 with most being done in the early 1850s. Griffith's Valuation is the most comprehensive survey of 19th century households for Ireland still in existence. The Griffith's Valuation records are also useful because they were type-set and printed in the 19th century and have been digitized in the 21st century.

An extraction of the Larkin records in the Griffith's Valuation yielded 1,124 records for Ireland (1,062 of which were for counties now in The Republic of Ireland). The pie chart in Figure 16 shows the distribution of these records by county. Approximately 32% of the records came from the counties of Galway, Offaly, Roscommon, and Tipperary which encompass the Hy Many area.

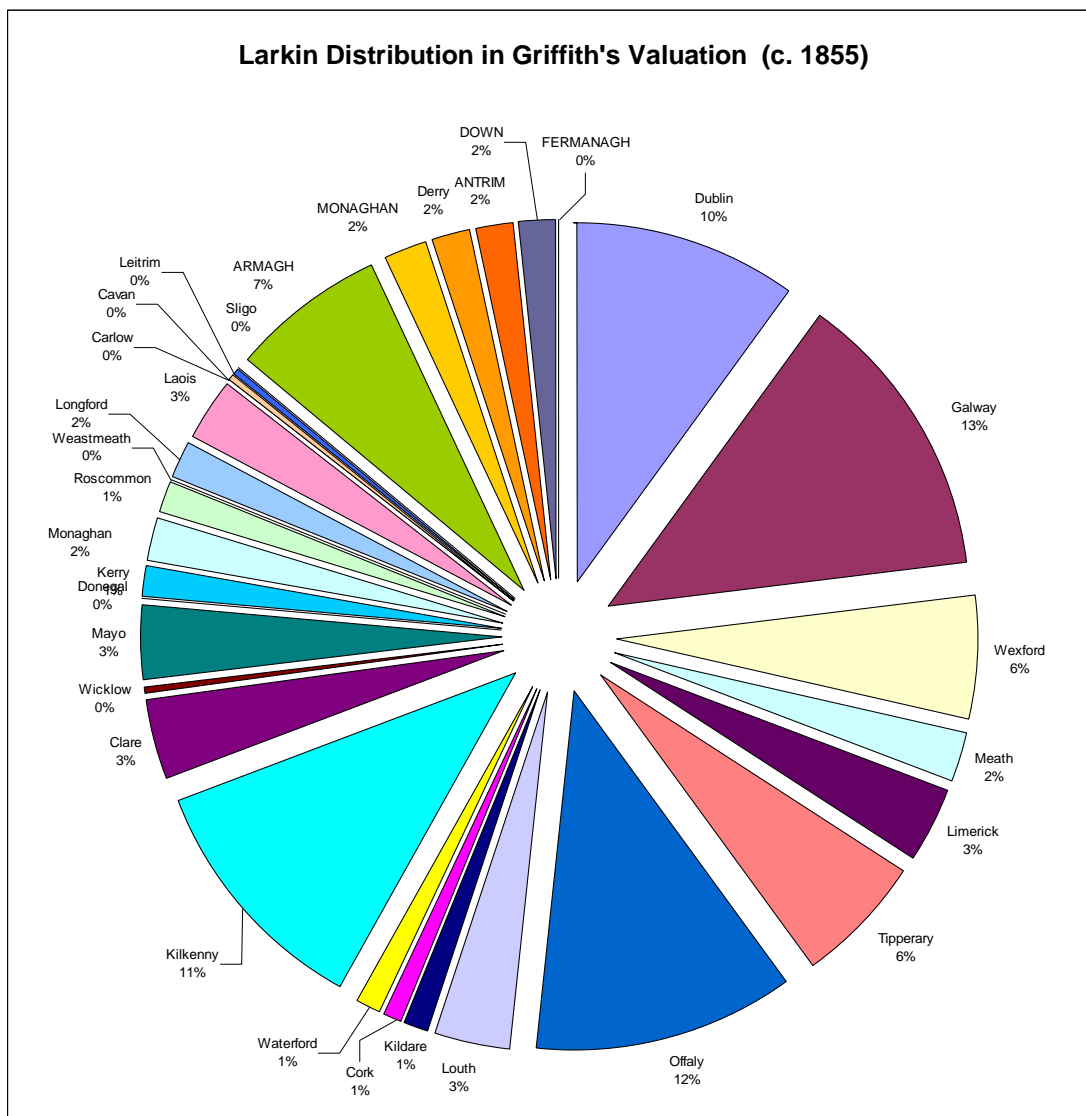


Figure 16: Larkin Distribution in Griffith's Valuation about 1855²¹

²¹ *Primary Valuation of Tenements* (aka Griffith's Valuation) 1847-1864. Larkin extraction and analysis performed by Bradley T. Larkin using database at <http://www.irishorigins.com>, 2006.

Eircom Telephone Directory

Eircom, the national telephone provider in The Republic of Ireland, has a searchable online directory which includes residential surnames and addresses. A data extraction in the year 2009 found 759 Larkin residential listings. Figure 17 illustrates the distribution of these records by county.²²

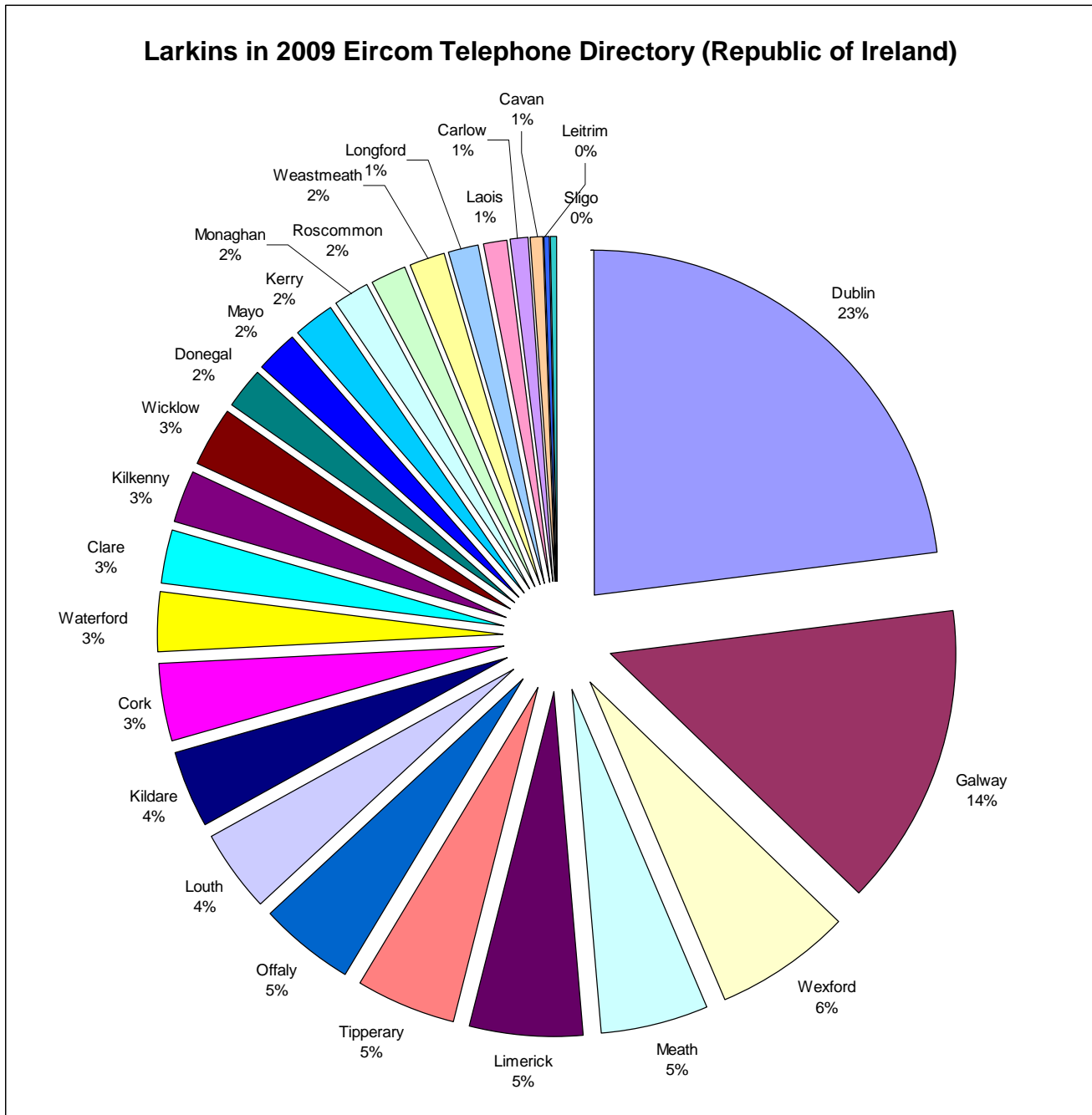


Figure 17: Larkin Distribution in the Republic of Ireland in 2009

²² Eircom Phonebook Online (2009). <http://www.eircomphonebook.ie>. Larkin extraction and analysis performed by the author.

Top 20 Parishes for Larkin Continuity

In order to prioritize how recruitment efforts for the Larkin DNA Project should be conducted, Irish parishes were ranked by the continuity of Larkin households in historical records. The ranking was calculated as the sum plus the product of the number of Larkin households found across three sets of records. Table 12 lists the top parishes (excluding major urban areas like Dublin).

$$\text{Rating} = (\# \text{ in Tithes}) + (\# \text{ in Griffiths}) + (\# \text{ in Eircom}) + \{ (\# \text{ in Tithes}) \times (\# \text{ in Griffiths}) \times (\# \text{ in Eircom}) \}$$

	County	Map Key ²³	Parish	Number In Tithes	Number In Griffiths	Number In 2009	Rating
1	Galway	39	Fahy	5	6	4	135
2	Galway	29	Clontuskert	2	7	5	84
3	Offaly	9	Birr	1	9	5	60
4	Galway	76	Killimorbogue	1	12	4	65
5	Limerick	109	Monagay	1	11	4	60
6	Offaly	44	Reynagh	2	10	2	54
7	Offaly	40	Lusmagh	1	25	1	52
8	Kilkenny	20	Callan	1	24	1	50
9	Galway	52	Kilcloony	1	6	6	49
10	Limerick	83	Killeedy	1	7	5	48
11	Tipperary	51	Lorrha	2	12	1	39
12	Offaly	43	Rahan	1	11	2	36
13	Galway	88	Kilmalinoge	3	2	4	33
14	Offaly	41	Lynally	1	8	2	27
15	Tipperary South	65	Kilsheelan	2	2	4	24
16	Laois	10	Borris	1	3	5	24
17	Tipperary	78	Youghalarra	2	6	1	21
18	Longford	15	Killoe	1	6	2	21
19	Galway	33	Donanaghta	1	4	3	20
20	Galway	26	Clonfert	-	13	3	16

Table 12: List of Irish Civil Parishes Ranked by Continuity and Quantity of Larkin households

Note that the author is not aware of and does not have access to an electronic index of the Tithe parishes for all of Ireland and so some parishes with potentially higher rankings may be identified in the future as the Tithe Applotment Books continue to be indexed and researched.

²³ Map key number corresponds to numbering of civil parishes at IrishTimes.com (2009).
<http://www.irishtimes.com/ancestor/browse/counties/civilmaps/index.cfm>.

