Unlocking Relationships with DNA
-by Dick McFarlane

DNA (deoxyribonucleic acid) is a very powerful tool in helping genealogists break through research barriers. It does not involve exhuming dead bodies, nor does it replace the paper record and good old-fashioned detective work.

The Clan MacFarlane DNA Project has been in existence since 2004 and has some 274 participants from around the world. It includes MacFarlanes from the United States, Canada, Scotland, Britain, Australia, and New Zealand. The project has uncovered some interesting relationships. For instance, some of us MacFarlanes are more closely related to the Clan MacGregor.

To be able to use DNA data effectively in genealogical research one must have a basic understanding of what DNA is, the terms used to describe it, how it is passed on from parent to child, and how to read the data provided.

There are two sources of DNA that are of interest to the genealogist: Y-chromosome and mitochondrial DNA. Y-chromosome DNA refers to the DNA found on the Y-chromosome and is found only in males. It is passed on from father to son and can be used to determine relationships in a genealogical time frame. The Y-chromosome is the male sex hormone. See Chart 1 to see how the Y-chromosome passes through the male line

Mitochondrial DNA is found in both males and females, but is only passed on from mother to daughter. Mitochondrial DNA is used to determine descent in anthropological time frames. In other words, it can determine ones descent from ancient populations, but it doesn't help one find a great grandmother. Chart 1 illustrates the problems with trying to use DNA to trace ancestry through the female line.

A third category of DNA is referred to as autosomal DNA. Autosomal DNA refers to all other DNA in the body and is not usually involved in tracing ancestry, however it can be used to determine inherited factors, e.g., height, eye color, susceptibility to disease, etc.

It is important to understand the concept of genetic distance and genetic mutation. In analyzing the genetic profile of those individuals that have a close relationship or genetic distance, one can determine which individuals have a more recent common ancestor. At some point the paper record must be brought into the quest. By analyzing the pedigrees of those with whom one has a close genetic match it is possible to determine the more likely lines to research and thus be able to breach the barriers in your search.

Selected Y-Chromosome Definitions

Allele – the number of repeats of a DNA sequence

Base – the four building blocks of DNA, simply designated A, T, C, & G (adenine, thymine, cytosine, guanine)

Chromosome – structures found in the nucleus of each cell. Humans have 23 pairs; 22 are called autosomal, one is the sex chromosome.

DNA – (Deoxyribonucleic acid) the genetic code that makes each of us unique, the genetic code that has been passed down through generations

Exact match – comparison between the DNA of two people that are exactly the same for all markers and regions compared

Gene – a region of DNA that codes for a specific function

Genealogical time frame – the most recent to 15 generations; recent genealogical time frame is one to five generations

Genetic Distance (GD) – the number of differences between two sets of results

Haplotype – a set of alleles that describe a person's genetic code

Junk DNA – DNA that doesn't code for genes, used for regulatory purposes

Locus – location in ones genetic code

Marker – physical location on the chromosome

Mitochondria – material in the cell that produces energy; mitochondria is passed on to both males and females by the mother

Mutation – an inheritable change that occurs in genetic material; the change may be in the number of repeats or in one of the bases

Mode – most common result for each marker tested

Organelle – part of a cell that performs a specialized function, such as the nucleus or the mitochondrion

Replication – the process by which DNA copies itself

Marker	Mode	56186	B1539	149452	120820	65802	206812	162109	130709	192536
393	13	13	13	13	13	13	13	13	13	13
390	24	24	24	24	24	24	24	24	24	24
19	14	14	14	14	14	14	14	14	14	14
391	10	10	10	10	10	10	10	10	10	10
385a	10	10	10	10	10	10	10	10	10	10
385b	14	14	14	14	14	14	14	14	14	14
426	12	12	12	12	12	12	12	12	12	12
388	12	12	12	12	12	12	12	12	12	12
439	12	12	12	12	12	12	12	12	12	12
389a	13	13	12	13	13	13	13	13	13	13
392	13	13	13	13	13	13	13	13	13	13
389b	30	30	30	30	30	30	30	30	30	30
458	19	19	19	19	19	19	19	20	20	20
459a	9	9	9	9	9	9	9	9	9	9
459b	10	10	10	10	10	10	10	10	10	10
455	11	11	11	11	11	10	10	11	11	11
454	11	11	11	11	11	11	11	11	11	11
447	25	25	25	25	25	25	25	25	25	25
437	15	15	15	15	15	15	15	15	15	15
448	19	19	19	19	19	19	19	19	19	19
449	30	30	30	30	30	30	30	30	30	30
464a	15	15	15	15	15	15	15	15	15	15
464b	15	15	15	15	15	15	15	15	15	15
464c	16	16	16	16	16	16	16	16	16	16
464d	17	17	17	17	17	17	17	17	17	16
460	11	11	11	11	11	11	11	11	12	11
H4	12	12	12	12	11	12	12	12	12	12
YCAa	19	19	19	19	19	19	19	19	19	19
YCAb	24	24	24	24	24	24	24	24	24	24
456	15	15	15	15	15	15	15	15	15	15
607	16	16	16	16	16	16	16	16	16	16
576	18	18	18	18	18	18	18	18	18	17
570	17	17	17	17	17	17	17	17	17	17
CDYa	37	37	37	36	37	37	37	37	37	37
CDYb	37	37	37	37	37	37	37	37	37	37
442	12	12	12	12	12	12	12	12	12	12
438	12	12	12	12	12	12	12	12	12	12
Gen Dist	0	*	0	1	1	1	1	1	2	3

(William McFarland, b. 1785 VA m. Rachel Faris)
(Duncan McFarland b. abt 1700, Ireland)
(Matthew Lark, b. 10 Apr 1828, Atrip, VA)
Unknown OKA
(Duncan McFarlane 1706 - 1768 VA)
(Daniel McFarland 1653 - 1738, Ireland)
(James McFarlane b. 1786 Dumbarton, Scotland)
William Harrison Mays (1845 - 1909)
(James McFarlane b. 1786 Dumbarton, Scotland)
Mode

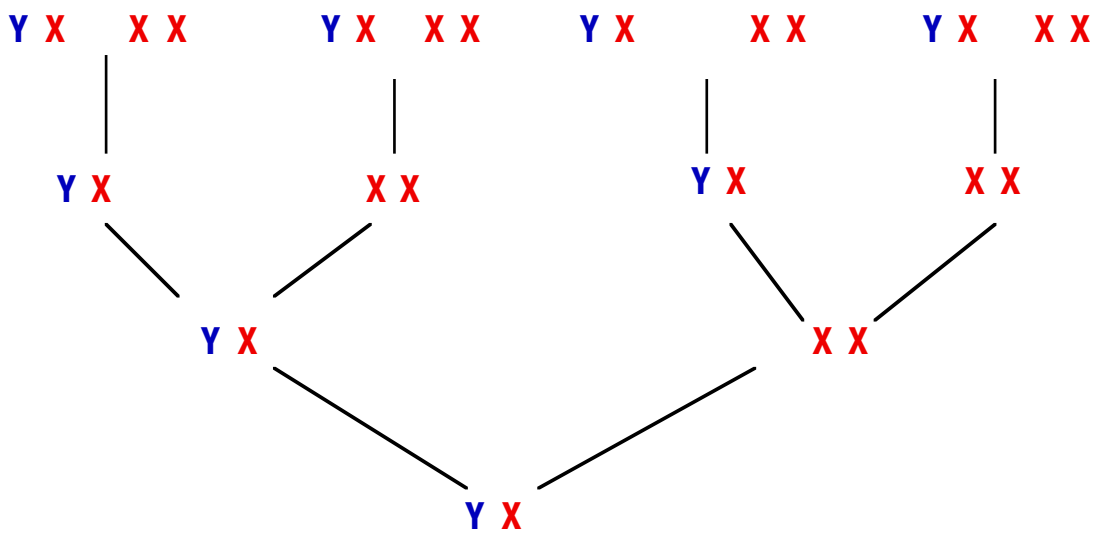
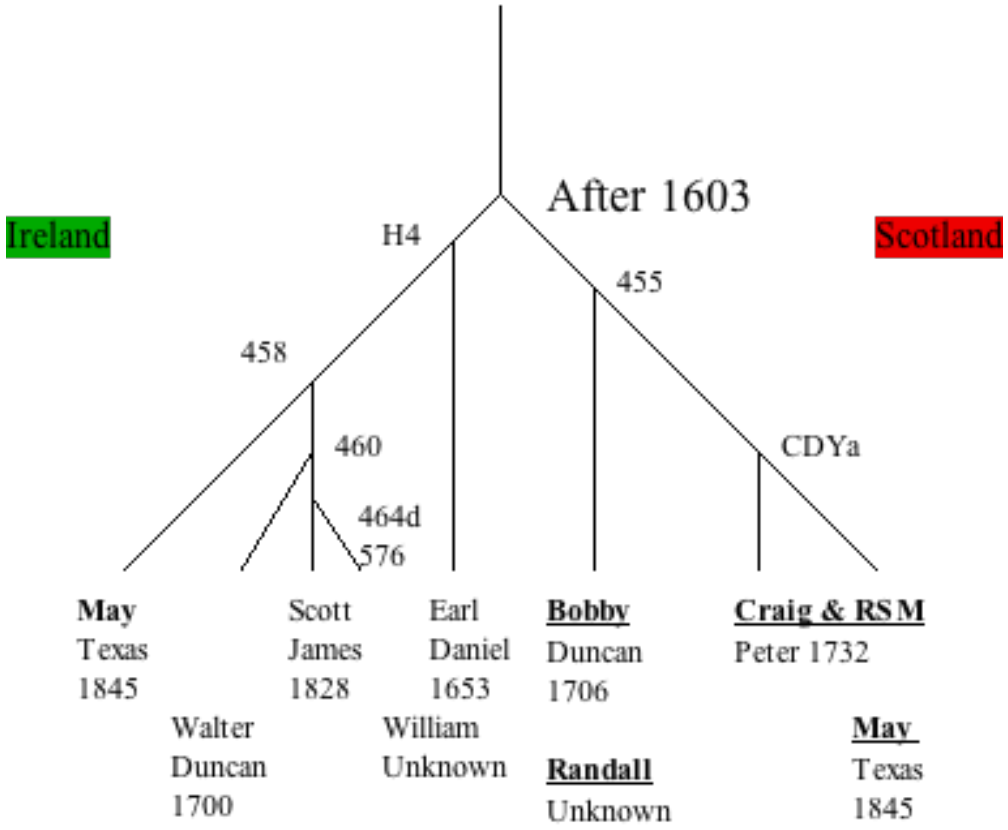


Chart showing DNA Descendency

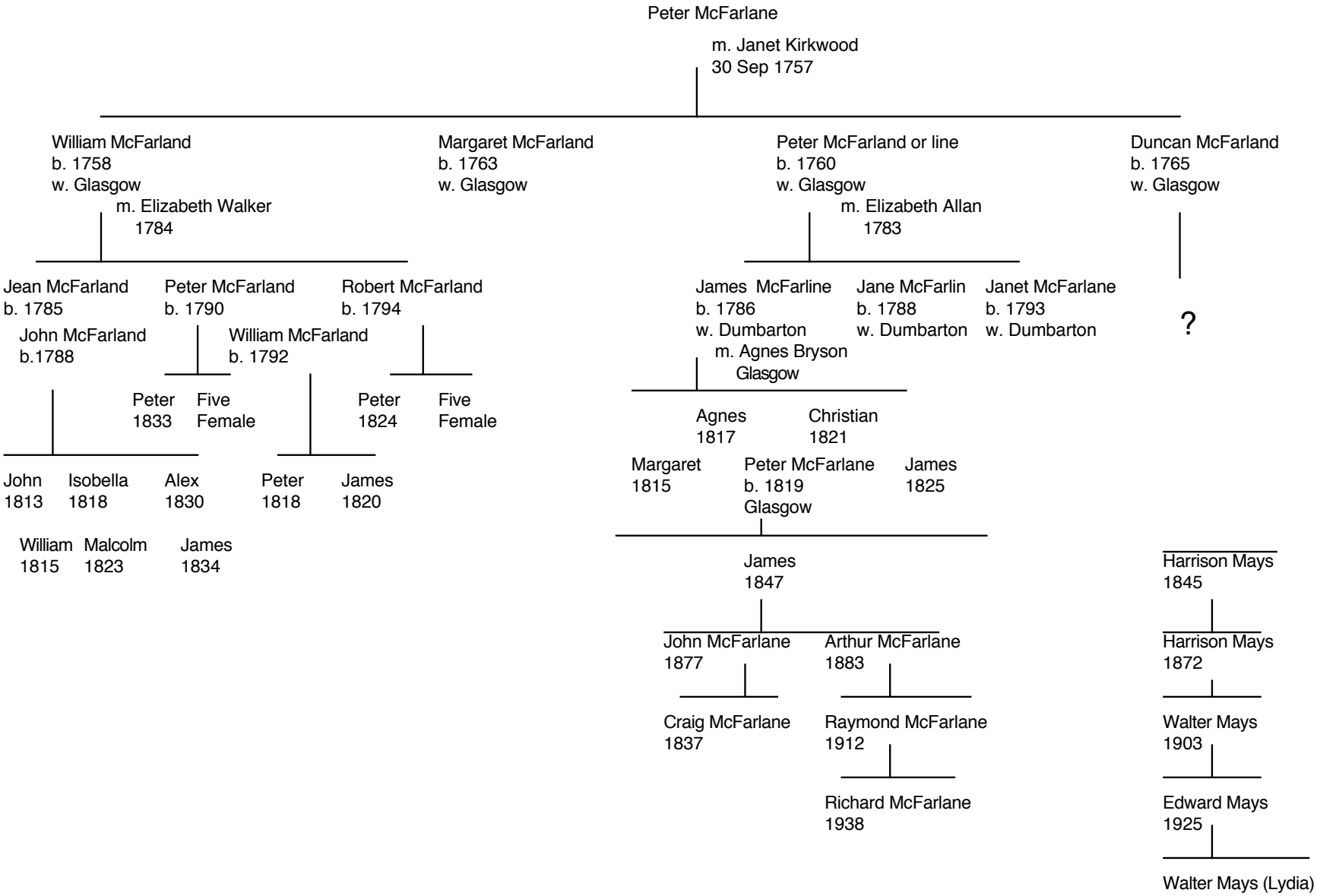
Chart 1

Analyzing the DNA Data



So, Where to from here?

Marker	Mode	56186	81539	149452	120820	65802	206812	162109	130709	192536
393	13	13	13	13	13	13	13	13	13	13
390	24	24	24	24	24	24	24	24	24	24
19	14	14	14	14	14	14	14	14	14	14
391	10	10	10	10	10	10	10	10	10	10
385a	10	10	10	10	10	10	10	10	10	10
385b	14	14	14	14	14	14	14	14	14	14
426	12	12	12	12	12	12	12	12	12	12
388	12	12	12	12	12	12	12	12	12	12
439	12	12	12	12	12	12	12	12	12	12
389a	13	13	12	13	13	13	13	13	13	13
392	13	13	13	13	13	13	13	13	13	13
389b	30	30	30	30	30	30	30	30	30	30
458	19	19	19	19	19	19	19	20	20	20
459a	9	9	9	9	9	9	9	9	9	9
459b	10	10	10	10	10	10	10	10	10	10
455	11	11	11	11	11	10	10	11	11	11
454	11	11	11	11	11	11	11	11	11	11
447	25	25	25	25	25	25	25	25	25	25
437	15	15	15	15	15	15	15	15	15	15
448	19	19	19	19	19	19	19	19	19	19
449	30	30	30	30	30	30	30	30	30	30
464a	15	15	15	15	15	15	15	15	15	15
464b	15	15	15	15	15	15	15	15	15	15
464c	16	16	16	16	16	16	16	16	16	16
464d	17	17	17	17	17	17	17	17	17	16
460	11	11	11	11	11	11	11	11	12	11
H4	12	12	12	12	11	12	12	12	12	12
YCAa	19	19	19	19	19	19	19	19	19	19
YCAb	24	24	24	24	24	24	24	24	24	24
456	15	15	15	15	15	15	15	15	15	15
607	16	16	16	16	16	16	16	16	16	16
576	18	18	18	18	18	18	18	18	18	17
570	17	17	17	17	17	17	17	17	17	17
CDYa	37	37	37	36	37	37	37	37	37	37
CDYb	37	37	37	37	37	37	37	37	37	37
442	12	12	12	12	12	12	12	12	12	12
438	12	12	12	12	12	12	12	12	12	12
GD	-	0	0	1	1	1	1	1	2	3
OKA		SC-1732	US-1845	SC-1732	IR-1653	VA/IR-1706	UNK	VA-1828	IR-1700	VA-1785


Peter McFarlane
m. Janet Kirkwood
30 Sep 1757
William McFarland
b. 1758
w. Glasgow
m. Elizabeth Walker
1784
Margaret McFarland
b. 1763
w. Glasgow
Peter McFarland or line
b. 1760
w. Glasgow
m. Elizabeth Allan
1783
Duncan McFarland
b. 1765
w. Glasgow
?
Jean McFarland
b. 1785
Peter McFarland
b. 1790
Robert McFarland
b. 1794
John McFarland
b.1788
William McFarland
b. 1792
Peter
1833
Five
Female
Peter
1824
Five
Female
John
1813
Isobella
1818
Alex
1830
Peter
1818
James
1820
William
1815
Malcolm
1823
James
1834
James McFarline
b. 1786
w. Dumbarton
Jane McFarlin
b. 1788
w. Dumbarton
Janet McFarlane
b. 1793
w. Dumbarton
m. Agnes Bryson
Glasgow
Agnes
1817
Christian
1821
Margaret
1815
Peter McFarlane
b. 1819
Glasgow
James
1825
James
1847
John McFarlane
1877
Arthur McFarlane
1883
Craig McFarlane
1837
Raymond McFarlane
1912
Richard McFarlane
1938
Harrison Mays
1845
Harrison Mays
1872
Walter Mays
1903
Edward Mays
1925
Walter Mays (Lydia)