CLAN CRAWFORD Y-DNA LINEAGE UPDATE PROCEDURES

By

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Y-DNA updates are continually arriving from Family Tree DNA and being posted to the Clan Crawford website. These consist of results from current Crawford surname participants who have purchased additional STR or SNP testing and new individuals who have just joined the Crawford Surname Project. It is not time efficient to post each one as they arrive so usually about every 2-3 months it is necessary to update the entire site by checking the status of every participant and noting changes in information.

The lineages are determined by the two Crawford Co-Administrators with discussion with the clan genealogists when questions arise concerning conflicts between DNA results and known or perceived genealogical family information. A master list is kept with the lineage group, individual participant's name, Family Tree kit number, number of STR markers tested and the predicted on known end SNP for each person.

In order to place individuals into specific lineages, the administrators complete an analysis using the Family Tree Y-DNA Comparison Utility FTDNA 111 Mode Beta at http://www.mymcgee.com/tools/yutility.html .

The following protocol is followed:

1. The Y-DNA markers for each person being compared are entered in the entry window with the first 10 spaces being used for their name or coded alphanumeric number.

2. The Genetic Distance is set to "infinite allele mutation model".

3. A PHILIP TMRCA file is generated

4. Confidence level is set at 95%

5. Mutation rate is set to reflect FTDNA calculated levels for each loci (.004-.0075).

6. A generation is set to 30 years.

7. Upon executing the computer program, tables are generated for:

    a. Mutation distances for all of the individuals entered into the program;

    b. Estimated TMRCA between individuals tested.

    c. A PHILIP table

8. The PHYLIP software is activated using the Philip file and the Kitch least squares analysis is generated. The Kitch program is set as follows:

   a. Option D Kitsch-Margoliash

   b. Select **L** for Lower triangular data matrix

   c. Select option **J** for randomized input order of species.

   d. When prompted for random number seed enter **9**

   e. When prompted for number of jumbles enter **99** .

9. The out file chooses the best fit of all the jumbles as the basis for creating a lineage tree.
10. The MEGA software is then used to generate a formal lineage tree

Table 1. Example of a Genetic Distance table between individuals (mutations)

Genetic Distance

ID	Ab3-520477	Ab3-B10746	Ab6-151365	Ab9-136902	Ab9-519372	Ab6-413080	Ab9-127457	Ab6-76403	Ab9-636875	Ab9-87507	Ab9-37564	Ab9-38087	Ac6-87590	Ac6-112747	Ac3-183276	Ac6-555331	Ad9-229314	Ad3-138442	Ad9-134368	Ad6-48160	Ad9-357293	Af9-413803	Af9-203412	Af9-447476	Af6-84633	Af6-276787	UG3-155890	UG2-84615	UG6-523855	UG6-121071	UG3-504012	UG6-239351
Ab3-520477	37	1	1	1	2	2	2	2	2	3	3	5	5	5	5	5	4	2	2	4	4	3	3	3	4	4	6	3	7	6	6	7
Ab3-B10746	1	37	0	0	1	1	1	1	1	2	2	4	4	4	4	4	3	1	1	3	3	2	2	2	3	3	5	2	6	5	5	6
Ab6-151365	1	0	67	1	2	2	2	2	2	3	3	5	6	6	4	6	4	1	3	3	4	3	3	3	4	4	5	2	7	7	5	8
Ab9-136902	1	0	1	111	5	1	2	1	5	7	7	7	5	5	4	5	7	1	7	4	6	5	7	9	3	3	5	2	6	6	5	7
Ab9-519372	2	1	2	5	111	2	6	2	6	5	7	7	6	6	4	6	6	2	5	4	9	7	9	8	4	4	6	2	6	7	6	8
Ab6-413080	2	1	2	1	2	67	0	0	0	1	2	3	6	6	5	6	4	2	3	3	4	3	3	3	2	4	6	2	7	7	6	8
Ab9-127457	2	1	2	2	6	0	111	0	3	5	6	5	6	6	5	6	7	2	7	3	6	5	7	9	2	4	6	2	7	7	6	8
Ab6-76403	2	1	2	1	2	0	0	67	0	1	2	3	6	6	5	6	4	2	3	3	4	3	3	3	2	4	6	2	7	7	6	8
Ab9-636875	2	1	2	5	6	0	3	0	111	3	4	5	6	6	5	6	8	2	7	3	8	6	7	9	2	4	6	2	7	7	6	8
Ab9-87507	3	2	3	7	5	1	5	1	3	111	5	6	7	7	6	7	8	3	6	4	10	8	9	11	3	5	6	2	8	8	7	9
Ab9-37564	3	2	3	7	7	2	6	2	4	5	111	7	7	7	6	7	10	3	8	5	8	8	9	11	4	5	7	2	7	8	5	9
Ab9-38087	5	4	5	7	7	3	5	3	5	6	7	111	7	7	6	7	10	4	8	4	10	5	8	9	3	5	4	4	8	8	7	10
Ac6-87590	5	4	6	5	6	6	6	6	6	7	7	7	67	2	2	3	8	4	5	9	4	5	3	3	4	4	5	2	11	5	3	8
Ac6-112747	5	4	6	5	6	6	6	6	6	7	7	7	2	67	2	3	8	4	5	9	4	5	3	3	4	4	5	2	11	5	3	8
Ac3-183276	5	4	4	4	4	5	5	5	5	6	6	6	2	2	37	2	5	4	3	5	3	4	2	2	3	3	5	3	8	3	3	6
Ac6-555331	5	4	6	5	6	6	6	6	6	7	7	7	3	3	2	67	8	4	5	9	4	5	3	3	4	4	5	3	11	3	3	8
Ad9-229314	4	3	4	7	6	4	7	4	8	8	10	10	8	8	5	8	111	4	8	5	10	8	10	12	6	6	8	3	6	8	7	10
Ad3-138442	2	1	1	1	2	2	2	2	2	3	3	4	4	4	4	4	4	37	2	4	4	2	2	2	3	3	5	2	7	5	5	6
Ad9-134368	2	1	3	7	5	3	7	3	7	6	8	8	5	5	3	5	8	2	111	6	8	6	6	7	3	3	4	2	8	6	4	7
Ad6-48160	4	3	3	4	4	3	3	3	3	4	5	4	9	9	5	9	5	4	6	67	7	5	6	6	5	7	6	3	6	10	8	11
Ad9-357293	4	3	4	6	9	4	6	4	8	10	8	10	4	4	3	4	10	4	8	7	111	8	8	10	4	4	6	3	8	5	2	7
Af9-413803	3	2	3	5	7	3	5	3	6	8	8	5	5	5	4	5	8	2	6	5	8	111	4	6	3	3	4	3	7	6	5	8
Af9-203412	3	2	3	7	9	3	7	3	7	9	9	8	3	3	2	3	10	2	6	6	8	4	111	6	1	1	3	2	8	4	3	6
Af9-447476	3	2	3	9	8	3	9	3	9	11	11	9	3	3	2	3	12	2	7	6	10	6	6	111	1	1	3	2	8	4	3	6
Af6-84633	4	3	4	3	4	2	2	2	2	3	4	3	4	4	3	4	6	3	3	5	4	3	1	1	67	2	4	2	9	5	4	7
Af6-276787	4	3	4	3	4	4	4	4	4	5	5	5	4	4	3	4	6	3	3	7	4	3	1	1	2	67	4	3	9	5	4	7
UG3-155890	6	5	5	5	6	6	6	6	6	6	7	4	5	5	5	5	8	5	4	6	6	4	3	3	4	4	37	4	9	6	6	8
UG2-84615	3	2	2	2	2	2	2	2	2	2	2	4	2	2	3	3	3	2	2	3	3	2	2	2	2	3	4	25	5	3	3	5
UG6-523855	7	6	7	6	6	7	7	7	7	8	7	8	11	11	8	11	6	7	8	6	8	7	8	8	9	9	9	5	67	10	8	13
UG6-121071	6	5	7	6	7	7	7	7	7	8	8	8	5	5	3	3	8	5	6	10	5	6	4	4	5	5	6	3	10	67	2	9
UG3-504012	6	5	5	5	6	6	6	6	6	7	5	7	3	3	3	3	7	5	4	8	2	5	3	3	4	4	6	3	8	2	37	7
UG6-239351	7	6	8	7	8	8	8	8	8	9	9	10	8	8	6	8	10	6	7	11	7	8	6	6	7	7	8	5	13	9	7	67

Related	Probably Related	Possibly Related
FTDNA's Interpreting Genetic Distance for 12 Markers		
FTDNA's Interpreting Genetic Distance for 25 Markers		
FTDNA's Interpreting Genetic Distance for 37 Markers		
FTDNA's Interpreting Genetic Distance for 67 Markers		
FTDNA's Interpreting Genetic Distance for 111 Markers		

- Infinite allele mutation model is used
- Values on the diagonal indicate number of markers tested

Table 2. Example of a TMRCA table in years before present. 95% confident no greater than years shown.

Time to Most Recent Common Ancestor (Years)

ID	Ab3-520477	Ab3-B10746	Ab6-151365	Ab9-136902	Ab9-519372	Ab6-413080	Ab9-127457	Ab6-76403	Ab9-636875	Ab9-87507	Ab9-37564	Ab9-38087	Ac6-87590	Ac6-112747	Ac3-183276	Ac6-555331	Ad9-229314	Ad3-138442	Ad9-134368	Ad6-48160	Ad9-357293	Af9-413803	Af9-203412	Af9-447476	Af6-84633	Af6-276787	UG3-155890	UG2-84615	UG6-523855	UG6-121071	UG3-504012	UG6-239351
Ab3-520477	37	570	570	570	720	720	720	720	720	930	930	1290	1290	1290	1290	1290	1110	720	720	1110	1110	930	930	930	1110	1110	1470	2040	1650	1470	1470	1650
Ab3-B10746	570	37	330	330	570	570	570	570	570	720	720	1110	1110	1110	1110	1110	930	570	570	930	930	720	720	720	930	930	1290	1620	1470	1290	1290	1470
Ab6-151365	570	330	67	450	570	570	570	570	570	690	690	960	1080	1080	1110	1080	810	570	690	690	810	690	690	690	810	810	1290	1620	1200	1200	1290	1350
Ab9-136902	570	330	450	111	630	450	330	450	570	690	690	690	960	960	1110	960	690	570	690	810	630	570	690	840	690	690	1290	1620	1080	1080	1290	1200
Ab9-519372	720	570	570	630	111	570	630	570	630	570	690	690	1080	1080	1110	1080	630	720	570	810	840	690	840	780	810	810	1470	1620	1080	1200	1470	1350
Ab6-413080	720	570	570	450	570	67	270	270	270	450	570	690	1080	1080	1290	1080	810	720	690	690	810	690	690	690	570	810	1470	1620	1200	1200	1470	1350
Ab9-127457	720	570	570	330	630	270	111	270	420	570	630	570	1080	1080	1290	1080	690	720	690	690	630	570	690	840	570	810	1470	1620	1200	1200	1470	1350
Ab6-76403	720	570	570	450	570	270	270	67	270	450	570	690	1080	1080	1290	1080	810	720	690	690	810	690	690	690	570	810	1470	1620	1200	1200	1470	1350
Ab9-636875	720	570	570	570	630	270	420	270	111	420	480	570	1080	1080	1290	1080	780	720	690	690	760	630	690	840	570	810	1470	1620	1200	1200	1470	1350
Ab9-87507	930	720	690	690	570	450	570	450	420	111	570	630	1200	1200	1470	1200	780	930	630	810	930	780	840	990	690	960	1470	1620	1350	1350	1650	1470
Ab9-37564	930	720	690	690	690	570	630	570	480	570	111	690	1200	1200	1470	1200	930	780	960	780	780	840	960	810	960	1650	1620	1200	1350	1290	1470	1590
Ab9-38087	1290	1110	960	690	690	690	570	690	570	630	690	111	1200	1200	1470	1200	930	1110	780	810	930	570	780	840	690	960	1110	2460	1350	1350	1650	1590
Ac6-87590	1290	1110	1080	960	1080	1080	1080	1080	1080	1200	1200	1200	67	570	720	690	1350	1110	960	1470	810	960	690	690	810	810	1290	1620	1740	960	930	1350
Ac6-112747	1290	1110	1080	960	1080	1080	1080	1080	1080	1200	1200	1200	570	67	720	690	1350	1110	960	1470	810	960	690	810	610	810	1290	1620	1740	960	930	1350
Ac3-183276	1290	1110	1110	1110	1110	1290	1290	1290	1290	1470	1470	1470	720	720	37	720	1290	1110	930	1290	930	1110	720	720	930	930	1290	2040	1860	930	930	1470
Ac6-555331	1290	1110	1080	960	1080	1080	1080	1080	1080	1200	1200	1200	690	690	720	67	1350	1110	960	1470	810	960	690	690	810	810	1290	2040	1740	690	930	1350
Ad9-229314	1110	930	810	690	630	810	690	810	780	780	930	930	1350	1350	1290	1350	111	1110	780	960	930	780	930	1050	1080	1080	1860	2040	1080	1350	1650	1590
Ad3-138442	720	570	570	570	720	720	720	720	720	930	830	1110	1110	1110	1110	1110	1110	37	720	1110	1110	720	720	720	930	930	1290	1620	1650	1290	1290	1470
Ad9-134368	720	570	690	690	570	690	690	690	690	630	780	780	960	960	930	960	780	720	111	1080	780	630	630	690	690	690	1110	1620	1350	1080	1110	1200
Ad6-48160	1110	930	690	810	810	690	690	690	690	810	960	810	1470	1470	1290	1470	960	1110	1080	67	1200	960	1080	1080	1470	1200	1470	2040	1080	1590	1860	1740
Ad9-357293	1110	930	810	630	840	810	630	810	780	930	780	930	810	810	930	810	930	1110	780	1200	111	780	780	930	810	810	1470	2040	1350	960	720	1200
Af9-413803	930	720	690	570	690	690	570	690	630	780	780	570	960	960	1110	960	780	720	630	960	780	111	480	630	690	690	1110	2040	1200	1080	1290	1350
Af9-203412	930	720	690	690	840	690	690	690	840	840	780	690	720	690	930	720	630	1080	780	480	111	630	450	450	930	1620	1350	810	930	1080
Af9-447476	830	720	690	840	780	690	840	690	990	990	840	690	690	720	690	1050	720	690	1080	930	630	630	111	450	450	930	1620	1350	810	930	1080
Af6-84633	1110	930	810	690	810	570	570	570	570	690	810	690	810	810	930	810	1080	830	690	960	810	690	450	450	67	570	1110	2040	1470	960	1110	1200
Af6-276787	1110	930	810	690	810	810	810	810	810	960	960	960	810	810	930	810	1080	930	690	1200	810	690	450	450	570	67	1110	2040	1470	960	1110	1200
UG3-155890	1470	1290	1290	1290	1470	1470	1470	1470	1470	1650	1110	1290	1290	1290	1290	1860	1290	1110	1470	1470	1110	930	930	1110	1110	37	2460	2040	1470	1470	1860
UG2-84615	2040	1620	1620	1620	1620	1620	1620	1620	1620	1620	1620	2460	1620	1620	2040	2040	2040	1620	1620	2040	2040	2040	1620	1620	1620	2040	2460	25	2910	2040	2040	2910
UG6-523855	1650	1470	1200	1080	1080	1200	1200	1200	1200	1350	1200	1350	1740	1740	1860	1740	1080	1650	1350	1080	1350	1200	1350	1350	1470	1470	2040	2910	67	1590	1860	2010
UG6-121071	1470	1290	1200	1080	1200	1200	1200	1200	1350	1350	1350	960	960	930	690	1350	1290	1080	1590	960	1080	810	810	960	960	1470	2040	1590	67	720	1470
UG3-504012	1470	1290	1290	1290	1470	1470	1470	1470	1470	1650	1290	1650	930	930	930	930	1650	1290	1110	1860	720	1290	930	930	1110	1110	1470	2040	1860	720	37	1650
UG6-239351	1650	1470	1350	1200	1350	1350	1350	1350	1350	1470	1470	1590	1350	1350	1470	1350	1590	1470	1200	1740	1200	1350	1080	1080	1200	1200	1860	2910	2010	1470	1650	67

0-270 Years	300-570 Years	600-870 Years	900-1170 Years

- Infinite allele mutation model is used
- Average mutation rate varies: 0.0024 to 0.0036
  Custom rates
- Values on the diagonal indicate number of markers tested
- Probability is 95% that the TMRCA is no longer than indicated

Table 3. Example of a PHILIP table

```
PHYLIP compatible TMRCA table
32
Ab3-520477 0 570 570 570 720 720 720 720 720 630 930 1290 1290 1290 1290 1290 1110 720 720 1110 1110 830 830 930 1110 1110 1470 2040 1650 1470 1470 1650
Ab3-B10746 570 0 330 330 570 570 570 570 570 720 720 1110 1110 1110 1110 1110 930 570 570 930 930 720 720 720 930 930 1290 1620 1470 1290 1290 1470
Ab6-151365 570 330 0 450 570 570 570 570 570 690 690 960 1080 1080 1110 1080 810 570 690 690 810 690 690 690 810 810 1290 1620 1200 1200 1290 1350
Ab9-136902 570 330 450 0 630 450 330 450 570 690 690 690 960 960 1110 960 690 570 690 810 630 570 690 840 690 690 1290 1620 1080 1080 1290 1200
Ab9-519372 720 570 570 630 0 570 630 570 630 570 690 690 1080 1080 1110 1080 620 720 570 810 840 690 840 780 810 810 1470 1620 1080 1200 1470 1350
Ab6-413080 720 570 570 450 570 0 270 270 270 450 570 690 1080 1080 1290 1080 810 720 690 690 810 690 690 690 570 810 1470 1620 1200 1200 1470 1350
Ab9-127457 720 570 570 330 630 270 0 270 420 570 630 570 1080 1080 1290 1080 690 720 690 690 630 570 690 840 570 810 1470 1620 1200 1200 1470 1350
Ab6-76403 720 570 570 450 570 270 270 0 270 450 570 690 1080 1080 1290 1080 810 720 690 690 810 690 690 690 570 810 1470 1620 1200 1200 1470 1350
Ab9-636875 720 570 570 570 630 270 420 270 0 420 480 570 1080 1080 1290 1080 780 720 690 690 760 630 690 840 570 810 1470 1620 1200 1200 1470 1350
Ab9-87507 930 720 690 690 570 450 570 450 420 0 570 630 1200 1200 1470 1200 780 930 630 810 930 780 840 990 690 960 1470 1620 1350 1350 1650 1470
Ab9-37564 930 720 690 690 690 570 630 570 480 570 0 690 1200 1200 1470 1200 930 830 960 780 780 840 960 810 960 1650 1620 1200 1350 1290 1470 1590
Ab9-38087 1290 1110 960 690 690 690 570 690 570 630 690 0 1200 1200 1470 1200 930 1110 780 810 930 570 780 840 690 960 1110 2460 1350 1350 1650 1590
Ac6-87590 1290 1110 1080 960 1080 1080 1080 1080 1080 1200 1200 1200 0 570 720 690 1350 1110 960 1470 810 960 690 690 810 810 1290 1620 1740 960 930 1350
Ac6-112747 1290 1110 1080 960 1080 1080 1080 1080 1080 1200 1200 1200 570 0 720 690 1350 1110 960 1470 810 960 690 810 610 1290 1620 1740 960 930 1350
Ac3-183276 1290 1110 1110 1110 1110 1290 1290 1290 1290 1470 1470 1470 720 720 0 720 1290 1110 930 1290 930 1110 720 720 930 930 1290 2040 1860 930 930 1470
Ac6-555331 1290 1110 1080 960 1080 1080 1080 1080 1080 1200 1200 1200 690 690 720 0 1350 1110 960 1470 810 960 690 690 810 810 1290 2040 1740 690 930 1350
Ad9-229314 1110 930 810 690 630 810 690 810 780 780 930 930 1350 1350 1290 1350 0 1110 780 960 930 780 930 1050 1080 1080 1860 2040 1080 1350 1650 1590
Ad3-138442 720 570 570 570 720 720 720 720 720 930 830 1110 1110 1110 1110 1110 1110 0 720 1110 1110 720 720 720 930 930 1290 1620 1650 1290 1290 1470
Ad9-134368 720 570 690 690 570 690 690 690 690 630 780 780 960 960 930 960 780 720 0 1080 780 630 630 690 690 690 1110 1620 1350 1080 1110 1200
Ad6-48160 1110 930 690 810 810 690 690 690 690 810 960 810 1470 1470 1290 1470 960 1110 1080 0 1200 960 1080 1080 1470 1200 1470 2040 1080 1590 1860 1740
Ad9-357293 1110 930 810 630 840 810 630 810 780 930 780 930 810 810 930 810 930 1110 780 1200 0 780 780 930 810 810 1470 2040 1350 960 720 1200
Af9-413803 930 720 690 570 690 690 570 690 630 780 780 570 960 960 1110 960 780 720 630 960 780 0 480 630 690 690 1110 2040 1200 1080 1290 1350
Af9-203412 930 720 690 690 840 690 690 690 840 840 780 690 720 690 930 720 0 1350 1110 0 720 0 1350 1110 960 780 480 810 450 450 930 1620 1350 810 930 1080
Af9-447476 930 720 690 840 760 690 840 690 840 990 990 840 690 690 720 690 1050 720 690 1080 930 630 630 0 450 450 930 1620 1350 810 930 1080
Af6-84633 1110 930 810 690 810 570 570 570 570 690 810 690 810 810 930 810 1080 830 690 960 810 690 450 450 0 570 1110 2040 1470 960 1110 1200
Af6-276787 1110 930 810 690 810 810 810 810 810 960 960 960 810 810 930 810 1080 930 690 1200 810 690 450 450 570 0 1110 2040 1470 960 1110 1200
UG3-155890 1290 1290 1290 1290 1470 1470 1470 1470 1470 1650 1110 1290 1290 1290 1290 1860 1290 1110 1470 1470 1110 930 930 1110 1110 0 2460 2040 1470 1470 1850
UG2-84615 2040 1620 1620 1620 1620 1620 1620 1620 1620 1620 1620 2460 1620 1620 2040 2040 2040 1620 1620 2040 2040 2040 1620 1620 1620 2040 2460 0 2910 2040 2040 2910
UG6-523855 1650 1470 1200 1080 1080 1200 1200 1200 1200 1350 1200 1350 1740 1740 1860 1740 1080 1650 1350 1080 1350 1200 1350 1350 1470 1470 2040 2910 0 1590 1860 2010
UG6-121071 1470 1290 1200 1080 1200 1200 1200 1200 1350 1350 1350 960 960 930 960 930 690 1350 1290 1080 1590 810 810 960 960 810 810 1620 2040 1590 0 720 1470
UG3-504012 1470 1290 1290 1290 1470 1470 1470 1470 1470 1650 1290 1650 930 930 930 930 1650 1290 1110 1860 720 1290 930 930 1110 1110 1470 2040 1860 720 0 1650
UG6-239351 1650 1470 1350 1200 1350 1350 1350 1350 1350 1470 1470 1590 1350 1350 1470 1350 1590 1470 1200 1740 1200 1350 1080 1080 1200 1200 1860 2910 2010 1470 1650 0
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