Interview with Dr. David MacLennan of the University of Toronto about the Clan MacLennan DNA Project:

Part 2: If we want to pursue our genetic genealogy, how can we do this and what can we expect from the results?

Melanie:
For those interested in pursuing DNA testing and joining the MacLennan Surname Project how would you advise that they proceed? What test is best to ask for and what company should be used for DNA testing for the Clan MacLennan Project?

David:
Since it is important to work from large databases and since Family Tree DNA has by far the largest STR marker database, I recommend that you start by ordering the 67 marker test offered by Family Tree DNA (FTDNA) (www.familytreedna.com). You can always upgrade to 111 markers if and when it becomes appropriate. Don't be tempted to save money by ordering a smaller number of markers. They will be found to be inadequate for any deductions and you will have to continue to upgrade at ever increasing expense.

Melanie:
So, depending on one`s budget, the 67 or 111 marker tests are a good start. It seems that would be the first step and it`s reasonably affordable. Once the tested individual begins to have very close matches at this level, what testing would be the next step to determine further kinship?

David:
Once you have established your haplotype and, perhaps, have been able to make a reasonable deduction about your haplogroup through your STR markers, you might also be able to make deductions about which clade and even subclade you might belong to. Deductions, however, must be confirmed by SNP testing. Here there are several approaches and several companies offering services. FTDNA offers single SNP tests and "SNP Packs" and YSEQ DNA Shop (www.yseq.net) also offers both of these services. You will have to think carefully or seek advice on which tests to take and value for the money you are willing to spend. A project administrator or volunteer advisor can help with this.

Melanie:
If we already know that there are at least two haplogroups and several clades and subclades within the MacLennan Surname Project, is it important to pursue further testing?

David:
Genetic genealogy is a thoroughly communal exercise and virtually everyone tested will differ from everyone else by at least one DNA base change. The MacLennan surname project does not have a large number of participants, so we have only scratched the surface of the information that could be collected about the clan. Thus, we are likely to find more haplogroups and many more Scots-specific and even family-specific SNPs as more people become involved with testing. For example, we might learn what SNPs are truly associated with the Picts and how we relate to the Picts, Gaels and Vikings, who make up so much of our heritage.

Many projects are now designated by SNP names rather than surnames. Many in the MacLennan surname project will find themselves migrating to the L21 or DF27 or M222 SNP projects, all of which have Yahoo DNA forums that you can join once you know or even suspect suspect what your clade might be. There you can read about the experiences of others and seek the advice from the exceptionally competent administrators of these projects or from skilled

and experienced volunteers. Join one or more of these forums!

Melanie:
It seems to me from what you have described that a crucial part of the research relies on having enough people partake in the research by having their DNA tested and participating in the research collaboration. As in any research project, the larger the sample of data collected the stronger the interpretation of the results can be.
Describe for us the challenges and options of the more detailed testing that is available for those who wish to pursue it.

David:
A limiting factor in getting to terminal SNPs is that we can only test for SNPs that are known and we only know a fraction of them. An overall goal is to find as many SNPs as possible in every branch (we can never find them all as new Y chromosome SNPs are arising somewhere all the time). Thus FTDNA, Full Genome Corporation (FGC) and Y Full, among others, offer Y chromosome sequencing for SNP discovery. FTDNA offers the Big Y test, which sequences about 60% of the accessible area of the Y chromosome for US$575.00, but this price is often reduced to $475 through discount coupons. In the future, you are likely to have to pay again to get the remaining 40% sequenced. By contrast, FGC sequences all of the accessible region of the Y chromosome at once for $750.

Melanie:
In the situations where there are a limited number of male family members still living, is it a good idea to do the basic testing of the 67 or 111 markers now, and wait to expand on the testing when one can afford to? Can the same sample be used for more than one test?

David:
There is no urgency to carry out every test at once and most people integrate DNA testing into their budgets over a number of years. People should think carefully about the best strategy to get to their goal of finding their terminal SNP and this will get easier and cheaper with time. Also novel SNPs are continually being discovered and individuals will want to test for any future novel SNPs that might extend their terminal SNPs.

The amount of DNA isolated from a cheek swab allows for a very large number of tests and, once DNA is stored with FTDNA or YSEQ or other companies, it is stable for retesting for several years. I'm not sure if companies have set a storage age limit on DNA, but 30 year-old DNA samples stored in my lab are unchanged and usable.

If there is concern about a limited number of male family members still living, remember that the chances are about 3 to 1 that there will be no difference in the YDNA sequence in passage from father to son and an only slightly increased chance of a difference between uncle and nephew. DNA samples are pretty much equivalent over gaps of 2 or 3 generations. Many women interested in the genealogy of their paternal line have joined DNA projects by enlisting their male cousins to provide DNA samples.

Melanie:
It is becoming very apparent that this is a rapidly expanding science and we are in early days of what DNA may be able to tell us about our origins, family history and migrations. What do you hope we`ll see developing over the next five years in terms of understanding our Clan relationships and history?

David:
I think there are both cultural and technological aspects to this question. DNA testing is not being done uniformly across the world. There is a lot of activity in the UK-North American-Australian axis that is driven by the descendants of people who were forced out of Ireland by the famine and out of Scotland by the clearances and lack of opportunity in the 1800s. The descendants of these people want to know their connection to the "homeland". Many very active project

administrators belong to this group. Enthusiasm is lower among the descendants of those who remained in Britain and on the continent. In the next five years, the accelerating and interesting advances that are currently being made in genetic genealogy should stir up more widespread enthusiasm, which will increase the size of databases and give us more information on our relationships within the clan and on the background of our haplogroups and SNPs that arose on the continent and moved into Britain.

There are developments in DNA that may be especially attractive to MacLennan clan members. F1265 is proposed to have arisen in Scotland and L1065, found in other MacLennans, has been suggested to be a Pictish SNP. Within the next five years, we will have answers to many more intriguing questions about relationships within the MacLennan clan and such answers will drive enthusiasm for DNA testing. I think this is called a virtuous cycle.

It's interesting to me that humans, after age 60, realize they had better start now to learn about their history and the legacy of knowledge they can leave to their families. Statisticians in the FTDNA projects use 1950 CE as the base year for their calculations because the average age of people being tested is about 65. It would be great if we could find a way to lower the age of participation in DNA testing.

A very encouraging sign for the future of the genetic genealogy of the MacLennan clan is the enthusiasm shown by Chief Ruairidh, who is highlighting DNA testing in Clan gatherings and through many of the other activities that he oversees. In addition we have enthusiastic, knowledgeable Commissioners in Canada (Melanie McLennan) and Australia (Bruce McLennan) who are working hard and imaginatively through their website and newsletters to build more and better clan communication.

Technologically, we can expect big changes. Even now, we can get most of the comparative information we use from full sequences of the Y chromosome, but only the SNP information is widely used. Information about STR markers lies in the sequence, but needs to be made more reliable. In five years, I think that all data collection will be from full Y chromosome sequences. Of course, to be widely used, sequencing will have to be faster and cheaper, all parts of the Y chromosome will have to be made accessible and all of the data will have to be reliable. An enormous amount of research is being done on new ways to perform DNA sequencing for two main reasons. The first is to promote personalized medicine and the second is to get at the sequences of ancient DNAs - results are now being published on tiny amounts of 40,000 year-old DNA. Such advances will spill over into improvements in the technology used in genetic genealogy.

Melanie:
Thank you David for your excellent explanation of DNA testing and analysis. This has cleared away some of the muddle for me and I hope it will for others. We sincerely appreciate your assistance and your expertise with the MacLennan Surname DNA Project.