



**The Paleo-DNA
Laboratory is your ISO
17025 accredited lab
for:**

- **Forensic DNA**
- **Ancient DNA**
- **Paternity and
Relationship
Testing**
- **Ancestry DNA**

Important Dates:

2011 Ancient DNA Training
Program dates: May 09-27

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**The Paleo-DNA
Laboratory does
replication work
for authentica-
tion of results.**

What Can DNA Tell Us?

Any biological sample contains DNA. DNA is located in all organisms that contain cells. We use DNA to gather genetic information about a particular individual. This information can be used to match or exclude a suspect to a piece of evidence, determine paternity, or some other biological relationship. Three main types of DNA are used in human identification: maternal DNA, paternal DNA, and autosomal DNA. Maternal DNA is passed down through the mother's maternal (female) lineage. Paternal DNA is passed down through the father's paternal (male) lineage. Autosomal DNA is a 50/50 mixture of each biological parent's DNA making the mixture unique to an individual person. Autosomal DNA is the best type of DNA to use in forensics or determining if samples come from a common source. Autosomal DNA is also used for paternity testing where 50% of a child's DNA must match both parent's DNA for a biological relationship to be established. Maternal and Paternal DNA are used to establish biological

relationships over many generations and can sometimes be used when autosomal testing cannot be done.

The amount of information that can be achieved from a biological sample is dependent on the sample type and its environment. Blood, buccal (cheek), and hair shaft with a root attached are excellent sources of DNA and provide an unlimited amount of all DNA types. Hair shaft without a root attached contains only maternal DNA. Bone and teeth contain maternal DNA and a limited quantity of paternal and autosomal DNA depending on the level of preservation of the sample. As DNA degrades over time, the autosomal/paternal DNA is affected first, followed by the maternal DNA. If the samples in question are old or degraded, then it is less likely that autosomal DNA can be achieved and more likely that maternal DNA would be more successful.

*“Mitochondrial DNA
is in our blood.”*

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Lakehead
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We value your feedback. If you would like to comment on this issue or would like to suggest ideas to discuss in a future newsletter, please visit the following link:

<http://lucas.lakeheadu.ca/customer-survey>

Leading Edge Genetic Research at LU

The Paleo-DNA Laboratory supports the research and teaching done at Lakehead University. Here are some highlights of the genetic work currently being conducted.

Roxanne Boonstra is a Master's student of the University of Miami, Rosenstiel School of Marine and Atmospheric Science. She is investigating the effects of anthropogenic climate change of coral reefs by identifying algal symbiont DNA from recent (<10 years) and preserved (40-200 years) samples. The algal symbiont departs its coral host under environmental stresses such as increases in sea surface temperatures. She is looking at whether these symbionts are responding to current climate change and other environmental events.

Miss Morgan Campbell is a visiting scholar from the University of Manitoba. Miss Campbell is a former graduate of the Paleo-DNA Laboratory Ancient DNA Training Program and currently a Ph.D. candidate working on the final component of her doctoral dissertation. Her project involved the genetic analysis of 20 Inuit individuals for maternal haplogroup typing, immune profiling, genetic sexing, and the detection of Tuberculosis. She's looking into whether a portion of the current tuberculosis situation in Canadian Inuit populations is a reflection of population specific immunogenetic responses to infection within Inuit individuals and communities, and more specifically mycobacterium tuberculosis as this strain is highly influenced by the environment of the individual and the population.

Hosting Local and Visiting Scholars

Dr. Joseph Carney is a faculty member of the Lakehead University Biology Department. The purpose of his research is to determine the genetic relationships between populations of freshwater drum and how this relates to their geographic locales. He's looking at determining how these fish are genetically related, what may be a possible colonization path, and what evolutionary processes may have occurred to result in the present population structure. Freshwater drum have a huge latitudinal distribution, are the only freshwater Sciaenid in North America, and are the only known host for some parasitic species. This is interesting from both a phylogeographic and co-evolutionary standpoint.

Dr. Rhian Waller is a returning visiting scholar from the University of Hawaii. She is continuing her sub-fossil coral work. Sub-fossil corals can live for hundreds of years and their skeletons can remain for many hundreds of thousands of years after death. They provide an unprecedented high-resolution record of water mass evolution. The genetic information contained within can be used to define major changes in intermediate and deep ocean circulation. By being able to extract DNA from sub-fossil specimens thousands of years or tens of thousands of years old, she is examining how past climate has affected these coral population, and how they survived large events such as the North Atlantic Last Glacial Maximum (~20,000 years ago), or the warming of the Mediterranean Sea over 11,000 years ago.