

# DNA Evidence and Molecular Genetics Disprove the *Book of Mormon*

By Rich Deem

## Introduction

The *Book of Mormon* makes several scientific claims that can be tested. The chief claim, and the premise of the entire book, is that Hebrews carried the message of the coming Messiah on a voyage across the Atlantic. These Hebrews multiplied and were to eventually become the Native Americans found throughout the North and South American continents. Can this claim be established or falsified? Until recently, there was no answer. However, the DNA technology that has been used in courts of law can be used to test this claim directly.

## According to the *Book of Mormon*

This is an account of the history of the peoples of the Americas according to the *Book of Mormon*. The *First Book of Nephi* describes the family of Lehi, a descendant of Joseph, Son of Jacob,<sup>1</sup> and his wife Sariah, who lived in Jerusalem about 600 B.C. The Lord warned Lehi to depart out of the land of Jerusalem, because they were seeking to kill him because he had prophesied to the people concerning their iniquity. Lehi had four sons. Lehi's youngest son, Nephi, was more righteous than Laman, the firstborn, so he became the leader.

Nephi was told to build a ship to travel to a new promised land.<sup>2</sup> He and his brothers and their wives and a few other people landed in the Americas ~592 B.C.<sup>3</sup> From there, division arose among the brothers Nephi and Laman. The Nephites kept the Law of Moses and constructed a temple. The unbelief of the Lamanites led God to put a curse of black skin on them, whereas the Nephites were still "white, and exceedingly fair and delightsome."<sup>4</sup>

The Lamanites battled the Nephites and in 326 A.D. killed all of them except Moroni, who was given the account by his father Mormon, who wrote on gold plates and buried them at Cumorah Hill in New York State. Joseph Smith said that he was told about these plates, and spent three years translating them by the help of God. The accounts of these plates became the *Book of Mormon*.

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<sup>1</sup> And it came to pass that my father, Lehi, also found upon the plates of brass a genealogy of his fathers; wherefore he knew that he was a descendant of Joseph; yea, even that Joseph who was the son of Jacob, who was sold into Egypt, and who was preserved by the hand of the Lord, that he might preserve his father, Jacob, and all his household from perishing with famine. (*1 Nephi 5:14*)

<sup>2</sup> And it came to pass that the Lord spake unto me, saying: Thou shalt construct a ship, after the manner which I shall show thee, that I may carry thy people across these waters. (*1 Nephi 17:8*)

<sup>3</sup> See footnote at 1 Nephi 17.

<sup>4</sup> And he had caused the cursing to come upon them, yea, even a sore cursing, because of their iniquity. For behold, they had hardened their hearts against him, that they had become like unto a flint; wherefore, as they were white, and exceedingly fair and delightsome, that they might not be enticing unto my people the Lord God did cause a skin of blackness to come upon them. (*2 Nephi 5:21*)

## **Scientific claims of the *Book of Mormon***

The *Book of Mormon* claims that the Native American populations are descended from the Lamanites, who lived in ancient Israel 2,600 years ago. This concept is stated several times throughout the *Book of Mormon* and *Doctrine and Covenants* (both of which are part of the “standard works” that makeup the body of LDS scripture):

- “...Written to the Lamanites, who are a remnant of the house of Israel..” (*Book of Mormon:Title Page 1:2*)
- “...the Lamanites, and they are the principal ancestors of the American Indians” (*Book of Mormon:Introduction Preface:1-2*)
- “...I speak unto you [Lamanites], ye remnant of the house of Israel; and these are the words which I speak:  
Know ye that ye are of the house of Israel.” (*Book of Mormon:Mormon 7:1-2*)
- “Which is my word to the Gentile, that soon it may go to the Jew, of whom the Lamanites are a remnant...” (*Doctrine and Covenants: Section 19:27*)

## **DNA studies on the origin of Native Americans**

Although theoretically possible that a group of peoples could have traveled across the Atlantic Ocean 1,400 years ago, such a journey would have been extremely unlikely to succeed. Even travel across the Atlantic 500 years ago, with much better technology, was extremely risky. Through numerous scientific studies, scientists have concluded that Native American populations are derived from Asian populations, who crossed the Bering land bridge during or near the end of the last ice age. Because of the vast amount of continental glaciers, sea levels were ~300 feet lower than today, which created land bridges between many continents that are now isolated by ocean. However, much of the interior of the North American continent was still covered with glaciers, preventing migration from the West to the East at that time. The migrating population rapidly spread South along the West coast, reaching South America within a few hundred years or less. Once the continental and Bering Straight ice had melted by ~10,000 years ago, return from the Americas to Asia would have been extremely difficult, with travelers having to cross the Bering Sea by boat, braving the Artic storms. Scientific studies examining the origin of Native Americans use several different genetic techniques. The fact that all the techniques lead to the same conclusions is extremely strong evidence that verifies the validity of the studies. These genetic studies can be classified into six major groups:

- Y-chromosome
- mtDNA (mitochondrial DNA)
- Polymorphic Alu insertions
- Retroviral DNA elements
- Intestinal microbial flora
- Domesticated animals

## Y-chromosome

The Y-chromosome is the sex-determining chromosome found only in males. This chromosome is passed down from father to son, and so, records the history of descent along the male bloodline. Since it is passed down exclusively by males, there is no recombination on the chromosome, making the genetics considerably simpler than those found in the autosomal chromosomes, which recombine in each generation.

These studies show that Native Americans share genetic Y-chromosome polymorphisms with Siberian Asians. One study examined, a C-->T transition at nucleotide position 181 of the DYS199 locus, which was found in all five Native American populations studied.<sup>5</sup> The same polymorphism was found in two of nine native Siberian populations, the Siberian Eskimo and the Asian Chukchi. As a control, researchers examined the DYS287 Y Alu polymorphic element insertion and an A-->G transition at DYS271, both commonly found in Africans, but found neither African allele associated with the DYS199T allele in any of the Native American or native Siberian populations.

A second study examined the major groups of the Native American founding populations.<sup>6</sup> Haplotype M3, accounted for 66% of male Y-chromosomes and was found associated with native populations from the Chukotka peninsula in Siberia, adjacent to Alaska. The second major group of Native American Y-chromosomes, haplotype M45, accounted for about one-quarter of male lineages. This haplotype was found in the Lower Amur River and Sea of Okhotsk regions of eastern Siberia. The remaining 5% of Native American Y-chromosomes were of haplotype RPS4Y-T, which was found in the Lower Amur River/Sea of Okhotsk region of Siberia. These data suggested that Native American male lineages were derived from one or two major Siberian migrations.

An analysis of 63 polymorphisms and 10 tandem repeat sequences were analyzed for 2,344 Y chromosomes from Native American, Asian, and European populations.<sup>7</sup> Analysis of these sequences indicated that three major haplogroups, C, Q, and R, accounted for nearly 96% of Native American Y chromosomes. Haplogroups C and Q were found to represent early Native American founding Y chromosome lineages, while haplogroup R was found to come from recent admixture with Europeans. Phylogenetic analyses of haplogroups C and Q traced both lineages to an ancestral homeland in the Altai Mountains in Southwest Siberia, from 10,100 to 17,200 years ago.

Another study examined eight biallelic and six microsatellite polymorphisms from the Y chromosomes of 438 individuals from 24 Native American populations and in 404 Mongolians.<sup>8</sup>

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<sup>5</sup> Lell JT, Brown MD, Schurr TG, Sukernik RI, Starikovskaya YB, Torroni A, Moore LG, Troup GM, Wallace DC. 1997. Y chromosome polymorphisms in Native American and Siberian populations: identification of Native American Y chromosome haplotypes. *Hum. Genet.* 100:536-543.

<sup>6</sup> Lell JT, Sukernik RI, Starikovskaya YB, Su B, Jin L, Schurr TG, Underhill PA, Wallace DC. 2002. The dual origin and Siberian affinities of Native American Y chromosomes. *Am. J. Hum. Genet.* 2002 70:192-206.

<sup>7</sup> Zegura SL, Karafet TM, Zhivotovsky LA, Hammer MF. 2004. High-resolution SNPs and microsatellite haplotypes point to a single, recent entry of Native American Y chromosomes into the Americas. *Mol. Biol. Evol.* 21:164-175.

<sup>8</sup> Bortolini, M., et al. 2003. Y-Chromosome Evidence for Differing Ancient Demographic Histories in the Americas. *Am. J. Hum. Genet.* 73: 524–539.

The data showed that there were two major male migrations from southern/central Siberia to the Americas (with the second migration being restricted to North America). Age estimates based on Y-chromosome microsatellite diversity place the initial settlement of the American continent at 14,000 years ago.

Another study examined more than 2,500 Y-chromosomes of wide geographic origin for the presence of the DYS199T allele.<sup>9</sup> The allele was found only in Amerindian and East Asian populations. A large worldwide study of over 300 men examined 32 Y-chromosome haplotypes and traced the ancestors of Native Americans back to Central Siberia, primarily the Kets and Altaians from the Yenisey River Basin and Altai Mountains.<sup>10</sup> Another worldwide study examined over 2,000 males from 60 global populations and concluded that the founder population of Native Americans had migrated “from the general region of Lake Baikal to the Americas.”<sup>11</sup>

Other studies have examined the pattern of migration in the Americas revealed through Y chromosomal polymorphisms found in different Native American populations. These studies have found a North to South gradient of increasing genetic drift in the Americas.<sup>12</sup> This is contrary to the *Book of Mormon* claim that the founding populations originated in either Central America or Chile. If such claims were true, the gradient would run in the opposite direction. An additional study indicated that there was a “west-to-east migration of Native Americans during prehistoric times,”<sup>13</sup> which would be expected if Asians entered through Alaska and migrated South and East.

## Mitochondrial DNA (mtDNA)

Mitochondrial DNA (mtDNA) is passed down from mother to daughter, and so defines the lineage along the female bloodline. Therefore, it provides an independent means to confirm descent of population groups.

One study analyzed mtDNA in 42 Mongolians from Ulan Bator. All four Amerindian founding lineage haplotypes were detected in 54% of these 42 individuals, demonstrating an Asian

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<sup>9</sup> Bianchi, N.O., C. I. Catanesi, G. Bailliet, V. L. Martinez-Marignac, C. M. Bravi, L. B. Vidal-Rioja, R. J. Herrera, and J. S. López-Camelo. 1998. Characterization of Ancestral and Derived Y-Chromosome Haplotypes of New World Native Populations. *Am. J. Hum. Genet.* 63:1862-1871.

<sup>10</sup> FR Santos, A Pandya, C Tyler-Smith, SDJ Pena, M Schanfield, WR Leonard, L Osipova, MH Crawford, and RJ Mitchell. 1999. The Central Siberian Origin for Native American Y Chromosomes. *Am. J. Hum. Genet.* 64:619-628.

<sup>11</sup> TM Karafet, SL Zegura, O Posukh, L Osipova, A Bergen, J Long, D Goldman, W Klitz, S Harihara, P de Knijff, V Wiebe, RC Griffiths, AR Templeton, and MF Hammer. 1999. Ancestral Asian Source(s) of New World Y-Chromosome Founder Haplotypes. *Am. J. Hum. Genet.* 64:817-831.

<sup>12</sup> Bortolini MC, Salzano FM, Bau CH, Layrisse Z, Petzl-Erler ML, Tsuneto LT, Hill K, Hurtado AM, Castro-De-Guerra D, Bedoya G, Ruiz-Linares A. 2002. Y-chromosome biallelic polymorphisms and Native American population structure. *Ann. Hum. Genet.* 66:255-259.

Merriwether DA, Rothhammer F, Ferrell RE. 1995. Distribution of the four founding lineage haplotypes in Native Americans suggests a single wave of migration for the New World. *Am. J. Phys. Anthropol.* 98:411-430.

<sup>13</sup> Malhi, R. S., et al. 2002. The Structure of Diversity within New World Mitochondrial DNA Haplogroups: Implications for the Prehistory of North America. *Am. J. Hum. Genet.* 70: 905–919.

origin.<sup>14</sup> A second study examined mtDNA hypervariable segment I (HVS-1) from the Tuvinians and Buryats, two aboriginal populations of South Siberia. This study found that these populations expressed the four Native American-specific haplogroups (A-D) at frequencies of 72.2% and 55%.<sup>15</sup>

Another study, using 720 Amerindian mtDNA sequences, showed that Native Americans' ancestral-population differentiation occurred approximately 22,000 years ago,<sup>16</sup> well before the time frame given in the *Book of Mormon*. Other studies have set the date for the founding haplogroups at 34,000 years ago.<sup>17</sup> A study of mtDNA from 108 individuals from 700 year old burial site confirmed the founding populations originated 23,000-37,000 years ago.<sup>18</sup> More recent studies have shown that haplogroups A, B and C-D originate from different geographic areas of Siberia.<sup>19</sup> Thus, haplogroup A originated from populations of northwestern and northern Siberia, haplogroup B from the Ob River in the west, to the Upper Yenisei region in the east, and haplogroups C and D from the Ulchi of the Lower Amur. Another study showed through an analysis of haplogroups A-D and perhaps X that Native Americans rapidly colonized the Americas through coastal migration.<sup>20</sup>

Recently, ancient DNA techniques have been used to examine the genetics of pre-Columbian skeletal samples from Native Americans. One study examined the mtDNA haplogroups from 47 pre-Columbian skeletons from Cuba.<sup>21</sup> As expected, Native American haplogroups A-D were found among the remains. Another study of ancient (10,000+ years old) mtDNA from Prince of Wales Island, Alaska showed that the ancestors of ancient Native Americans migrated to California, Illinois, Mexico, Ecuador and Chile.<sup>22</sup> This DNA was also a close match with a member of the Han ethnic group from Qingdao in eastern China (see map, right). Most recently, scientists examined the coalescence times of



<sup>14</sup> Merriwether DA, Hall WW, Vahlne A, Ferrell RE. 1996. mtDNA variation indicates Mongolia may have been the source for the founding population for the New World. *Am. J. Hum. Genet.* 59:204-212.

<sup>15</sup> Derenko MV, Malyarchuk BA, Dambueva IK, Shaikhaev GO, Dorzhu CM, Nimaev DD, Zakharov IA. 2000. Mitochondrial DNA variation in two South Siberian Aboriginal populations: implications for the genetic history of North Asia. *Hum. Biol.* 72:945-973.

<sup>16</sup> SL Bonatto and FM Salzano. 1997. Diversity and Age of the Four Major mtDNA Haplogroups, and Their Implications for the Peopling of the New World. *Am. J. Hum. Genet.* 61:1413-1423.

<sup>17</sup> YB Starikovskaya, RI Sukernik, TG Schurr, AM Kogelnik, and DC Wallace. 1998. mtDNA Diversity in Chukchi and Siberian Eskimos: Implications for the Genetic History of Ancient Beringia and the Peopling of the New World. *Am. J. Hum. Genet.* 63:1473-1491.

<sup>18</sup> Stone AC, and M Stoneking. 1998. mtDNA Analysis of a Prehistoric Oneota Population: Implications for the Peopling of the New World. *Am. J. Hum. Genet.* 62:1153-1170.

<sup>19</sup> Starikovskaya EB, Sukernik RI, Derbeneva OA, Volodko NV, Ruiz-Pesini E, Torroni A, Brown MD, Lott MT, Hosseini SH, Huoponen K, Wallace DC. 2005. Mitochondrial DNA diversity in indigenous populations of the southern extent of Siberia, and the origins of Native American haplogroups. *Ann. Hum. Genet.* 69:67-89.

<sup>20</sup> Fix AG. 2005. Rapid deployment of the five founding Amerind mtDNA haplogroups via coastal and riverine colonization. *Am. J. Phys. Anthropol.* 128:430-436.

<sup>21</sup> Lalueza-Fox C, Gilbert MT, Martinez-Fuentes AJ, Calafell F, Bertranpetit J. 2003. Mitochondrial DNA from pre-Columbian Ciboneys from Cuba and the prehistoric colonization of the Caribbean. *Am. J. Phys. Anthropol.* 121:97-108.

<sup>22</sup> Dalton, R. 2005. Caveman DNA hints at map of migration. *Nature* 436:162.

haplogroups A2, B2, C, D1, and X2a, and found that all haplogroups originated between 20,000 and 22,000 years ago, suggesting a single migratory origin for all Native Americans.<sup>23</sup> This data directly contradicts the LDS claim that Middle Eastern haplogroups contributed to Native American genetics some 2,600 years ago.

## Polymorphic Alu insertions

The Alu family of retroposons is present at an extremely large copy number within the chromosomes of the human genome (500,000 copies/genome equivalent), representing approximately 10% of its mass. The majority of these elements are thought to be transcriptionally inactive pseudogenes. The distribution of the polymorphic Alu insertions is variable within population groups from different geographic origins, and is not random along individual human chromosomes.

A study examined 5 polymorphic Alu insertions in 895 unrelated individuals from 24 Native American populations compared to a worldwide population survey.<sup>24</sup> The results showed a close similarity between the Chinese and Native Americans, demonstrating a recent gene flow from Asia.

A more recent study examined the Alu insertion located in the 3' untranslated region of the LDLR gene, studying Mongolian, Siberian, and Native American populations.<sup>25</sup> Seven haplotypes were identified, with the greatest diversity between Siberian and Native American populations compared to Mongolians. The conclusions supported earlier mtDNA and Y-chromosome data, suggesting a single origin for the first colonizers of the American continent.

## Gut microbial flora

*Helicobacter pylori*, a chronic gastric pathogen of human beings, can be found in virtually every human population group. Variations of the bacteria can be divided into seven populations and subpopulations with distinct geographical distributions. Analysis of these bacteria within native populations worldwide reveals that the East Asian strain of *Helicobacter pylori* can be isolated from Native Americans, indicating that East Asians are the likely ancestor of Native Americans.<sup>26</sup>

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<sup>23</sup> Fagundes, N.J.R., et al. 2008. Mitochondrial Population Genomics Supports a Single Pre-Clovis Origin with a Coastal Route for the Peopling of the Americas. *American Journal of Human Genetics* 82: 583-592.

<sup>24</sup> Novick GE, Novick CC, Yunis J, Yunis E, Antunez de Mayolo P, Scheer WD, Deininger PL, Stoneking M, York DS, Batzer MA, Herrera RJ. 1998. Polymorphic Alu insertions and the Asian origin of Native American populations. *Hum. Biol.* 70:23-39.

<sup>25</sup> Heller AH, Salzano FM, Barrantes R, Krylov M, Benevolenskaya L, Arnett FC, Munkhbat B, Munkhtuvshin N, Tsuji K, Hutz MH, Carnese FR, Goicoechea AS, Freitas LB, Bonatto SL. 2004. Intra- and intercontinental molecular variability of an Alu insertion in the 3' untranslated region of the LDLR gene. *Hum. Biol.* 76:591-604.

<sup>26</sup> Falush D, Wirth T, Linz B, Pritchard JK, Stephens M, Kidd M, Blaser MJ, Graham DY, Vacher S, Perez-Perez GI, Yamaoka Y, Megraud F, Otto K, Reichard U, Katzowitsch E, Wang X, Achtman M, Suerbaum S. 2003. Traces of human migrations in *Helicobacter pylori* populations. *Science* 299: 1528-1529.

## Retroviral components

Human populations can become infected with commensal retroviruses that remain in the genome and are passed from generation to generation. The human T-cell lymphotropic retrovirus HTLV-II is found in Mongolians and many Native Americans, but not eastern Siberians.<sup>27</sup> Such data would be expected if Native Americans originated from Central Asia, as has been found in the other genetic studies.

## Domesticated animals

Native Americans had domesticated dogs in their settlements. Nearly all of these dogs were wiped out or interbred with European dogs, which were introduced into the Americas following the arrival of Columbus in 1492. Although no indigenous American dogs exist now, bones from pre-Columbian sites have been studied to examine the genetics of those animals.

Scientists extracted DNA from the bones of 37 dog specimens from archaeological sites in Mexico, Peru, and Bolivia, and 11 dog remains from Alaska, all of which were deposited before the arrival of Columbus in the New World.<sup>28</sup> Mitochondrial DNA sequences isolated from those ancient dog remains from Latin America and Alaska showed that Native American dogs originated from multiple Old World lineages of dogs that accompanied late Pleistocene humans across the Bering Strait.



Mesoamerican dog from  
200 B.C. - 500 A.D. -  
they had fleas even then

## Genetic Studies - Conclusions

The studies cited above represent only a fraction of those that have been done on the origin of Native American populations. The number of studies and the diversity of techniques used to examine the origin of Native Americans provide overwhelming support that the ancestors of the Native Americans came from Asia. The finding that all five mtDNA haplogroups (A-D and X) and both Y-chromosome haplogroups (C and Q) are found in native populations that inhabit the Altai Mountains in southwestern Siberia, suggest that those populations as the most likely ancestor of *all* Native American populations. The initial migration seems to have occurred between 20,000-15,000 years ago - before the emergence of the prehistoric Clovis sites (13,350-12,895 year ago) in North America.<sup>29</sup> Because an interior route through northern North America was unavailable for human passage until ~12,550 years ago (after the last glacial maximum)

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<sup>27</sup> Lairmore MD, Jacobson S, Gracia F, De BK, Castillo L, et al. 1990. Isolation of human T-cell lymphotropic virus type 2 from Guaymi Indians in Panama. *Proc. Natl. Acad. Sci. USA* 87:8840-8844.

Maloney EM, Biggar RJ, Neel JV, Taylor ME, Hahn BH, et al. 1992. Endemic human T cell lymphotropic virus type II infection among isolated Brazilian Amerindians. *J. Infect. Dis.* 166:100-107.

Hall WW, Zhu SW, Horai P, Furuta Y, Zagaany G, et al. 1994. HTLV-II infection in Mongolia. *AIDS Res. Hum. Retroviruses* 10:443.

Neel JV, Biggar RJ, Sukernik RI. 1994. Virologic and genetic studies relate Amerind origins to the indigenous people of the Mongolia/Manchuria/southeastern Siberia region. *Proc. Natl. Acad. Sci. USA* 91:10737-10741.

<sup>28</sup> Leonard JA, Wayne RK, Wheeler J, Valadez R, Guillen S, Vila C. 2002. Ancient DNA evidence for Old World origin of New World dogs. *Science* 298:1540-1542.

<sup>29</sup> Schurr TG, Sherry ST. 2004. Mitochondrial DNA and Y chromosome diversity and the peopling of the Americas: evolutionary and demographic evidence. *Am. J. Hum. Biol.* 16:420-439.

these ancestral groups must have used a coastal route to reach South America by 14,675 years ago (the date of the Monte Verde site in southern Chile). The initial migration brought mtDNA haplogroups A-D and Y-chromosome haplogroups P-M45a and Q-242/Q-M3 to the New World. A second expansion brought mtDNA haplogroup X and NRY haplogroups P-M45b, C-M130, and R1a1-M17 to North and Central America. Finally, populations that formerly inhabited Beringia expanded into northern North America, giving rise to Eskimo-Aleuts and Na-Dene Indians.<sup>29</sup>

## Objections to the studies

### Haplogroup X defines a European ancestry

The last haplogroup identified in Native American populations was haplogroup X, which is found in a small percentage of Native Americans. Although it has not been found in Native South Americans,<sup>30</sup> it is present primarily in the Northeast U.S. Native American groups. Originally, it was claimed that this haplogroup was from European ancestry. However, recent studies have shown that haplogroup X is found in Altaians from South Siberia.<sup>31</sup> Subsequent work showed that haplotype X is an ancient marker that is found worldwide.<sup>32</sup> Further analysis revealed that members of haplogroup X in Native Americans belong to a unique clade (X2a) that is not related to the European haplogroup.<sup>32</sup> Since it is present in low percentages, it would be expected to disappear in many people groups that were subject to the harsh living conditions of Siberia and glacial North America. Therefore, the claim that haplogroup X might represent the genetic contribution of populations described in the Book of Mormon is false.

### Genetic principles explain a lack of Jewish markers?

Mormon apologists have cited possible genetic effects to explain the lack of Jewish genetic markers in Native American populations. Frequently cited are the founder's effect and genetic drift. Although the terms sound scientific and possibly could explain the contradictory evidence, there is not a non-Mormon scientist who would accept those kinds of explanations as being valid. Let's first explain the principles and how they might apply to these studies. Founder effects can result from one individual becoming the dominant ancestor of a population. In the founder effect, if that one individual harbors a significant mutation compared to the population he came from, the genetics would be skewed toward that one individual. Genetic drift results in isolated populations as selective breeding occurs, skewing the genetics in a particular direction different from other isolated populations.

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<sup>30</sup> Dornelles CL, Bonatto SL, De Freitas LB, Salzano FM. 2005. Is haplogroup X present in extant South American Indians? *Am. J. Phys. Anthropol.* 127:439-448.

<sup>31</sup> Derenko MV, Grzybowski T, Malyarchuk BA, Czarny J, Miscicka-Sliwka D, Zakharov IA. 2001. The presence of mitochondrial haplogroup X in Altaians from South Siberia. *Am. J. Hum. Genet.* 69:237-241.

Zakharov IA, Derenko MV, Maliarchuk BA, Dambueva IK, Dorzhu CM, Rychkov SY. 2004. Mitochondrial DNA variation in the aboriginal populations of the Altai-Baikal region: implications for the genetic history of North Asia and America. *Ann. N. Y. Acad. Sci.* 1011:21-35.

<sup>32</sup> Reidla M, Kivisild T, Metspalu E, Kaldma K, Tambets K, et al. 2003. Origin and diffusion of mtDNA haplogroup X. *Am. J. Hum. Genet.* 73:1178-1190.

## Founder Effect

How could founder effect and genetic drift account for the data from these genetics studies? In the *Book of Mormon*, the male founders of the Nephites and Lamanites were descended from Lehi.<sup>33</sup> In addition to the sons of Lehi, two sons of Ishmael,<sup>34</sup> and the servant Zoram<sup>35</sup> traveled to the Americas and established the Ishmaelites and Zoramites peoples, respectively. It is unclear if the Ishmaelites and Zoramites ever intermarried with the Lamanites,<sup>36</sup> although the Ishmaelites received the same curse of dark skin as the Lamanites.<sup>37</sup> In addition, both the Ishmaelites and

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<sup>33</sup> An account of Lehi and his wife Sariah and his four sons, being called, (beginning at the eldest) Laman, Lemuel, Sam, and Nephi. The Lord warns Lehi to depart out of the land of Jerusalem, because he prophesieth unto the people concerning their iniquity and they seek to destroy his life. He taketh three days' journey into the wilderness with his family. Nephi taketh his brethren and returneth to the land of Jerusalem after the record of the Jews. The account of their sufferings. They take the daughters of Ishmael to wife. They take their families and depart into the wilderness. Their sufferings and afflictions in the wilderness. The course of their travels. They come to the large waters. Nephi's brethren rebel against him. He confoundeth them, and buildeth a ship. They call the name of the place Bountiful. They cross the large waters into the promised land, and so forth. This is according to the account of Nephi; or in other words, I, Nephi, wrote this record. (*Book of Mormon:1 Nephi 1 Summary*)

<sup>34</sup> The ship is finished—The births of Jacob and Joseph are mentioned—The company embarks for the promised land—The sons of Ishmael and their wives join in revelry and rebellion—Nephi is bound, and the ship is driven back by a terrible tempest—Nephi is freed, and by his prayer the storm ceases—They arrive in the promised land. [About 590—589 B.C.] (*Book of Mormon:1 Nephi 18 Summary*)

1 Ne. 18: 9 9 And after we had been driven forth before the wind for the space of many days, behold, my brethren and the sons of Ishmael and also their wives began to make themselves merry, insomuch that they began to dance, and to sing, and to speak with much rudeness, yea, even that they did forget by what power they had been brought thither; yea, they were lifted up unto exceeding rudeness. (*Book of Mormon:1 Nephi 18:9*)

<sup>35</sup> And it came to pass that Zoram did take courage at the words which I spake. Now Zoram was the name of the servant; and he promised that he would go down into the wilderness unto our father. Yea, and he also made an oath unto us that he would tarry with us from that time forth. (*Book of Mormon:1 Nephi 4:35*)

And it came to pass that I, Nephi, took one of the daughters of Ishmael to wife; and also, my brethren took of the daughters of Ishmael to wife; and also Zoram took the eldest daughter of Ishmael to wife. (*Book of Mormon:1 Nephi 16:7*)

Therefore the true believers in Christ, and the true worshipers of Christ, (among whom were the three disciples of Jesus who should tarry) were called Nephites, and Jacobites, and Josephites, and Zoramites. (*Book of Mormon:4 Nephi 1:37*)

<sup>36</sup> And it came to pass that Amalickiah sought the favor of the queen, and took her unto him to wife; and thus by his fraud, and by the assistance of his cunning servants, he obtained the kingdom; yea, he was acknowledged king throughout all the land, among all the people of the Lamanites, who were composed of the Lamanites and the Lemuelites and the Ishmaelites, and all the dissenters of the Nephites, from the reign of Nephi down to the present time. (*Book of Mormon:Alma 47:35*)

And the people of Ammon did give unto the Nephites a large portion of their substance to support their armies; and thus the Nephites were compelled, alone, to withstand against the Lamanites, who were a compound of Laman and Lemuel, and the sons of Ishmael, and all those who had dissented from the Nephites, who were Amalekites and Zoramites, and the descendants of the priests of Noah. (*Book of Mormon:Alma 43:13*)

<sup>37</sup> And the skins of the Lamanites were dark, according to the mark which was set upon their fathers, which was a curse upon them because of their transgression and their rebellion against their brethren, who consisted of Nephi, Jacob, and Joseph, and Sam, who were just and holy men. And their brethren sought to destroy them, therefore they were cursed; and the Lord God set a mark upon them, yea, upon Laman and Lemuel, and also the sons of Ishmael, and Ishmaelitish women. And this was done that their seed might be distinguished from the seed of their brethren, that thereby the Lord God might preserve his people, that they might not mix and believe in incorrect traditions which would prove their destruction. And it came to pass that whosoever did mingle his seed with that of the Lamanites did bring the same curse upon his seed. (*Book of Mormon:Alma 3:6-9*)

Zoramites eventually "became" Lamanites.<sup>38</sup> If the Ishmaelites and Zoramites ever intermarried with the Lamanites, there would be virtually no possibility of a founder effect regarding the Y-chromosome. Without intermarriage, if Lehi harbored some kind of skewed genetics, it would be reflected in his sons and their offspring. This could explain some of the Y-chromosome data, which is passed on only through the male line. However, since there are many different Y-chromosome haplotypes found at many loci, it is virtually impossible that *all* of those loci would be mutated in any one individual. It gets much worse for the Mormon apologist. Lehi's genetics could not explain the mtDNA genetics, since these genes are passed only through the female line. The wives of Lehi's sons were also from one family line - Ishmael. However, the *Book of Mormon* also describes the sisters of Nehi,<sup>39</sup> who may or may not have contributed to Lamanite genetics. Since there are four main Native American specific mtDNA haplotypes, one would have to hypothesize that all of these haplotypes were developed in the wives of Lehi's sons or their immediate daughters *and* that those haplotypes just happened to match those of East Asians. A third genetic technique examined the polymorphic Alu insertions found in the autosomal (non-X or Y) chromosomes, which matched Asian DNA. A fourth genetic technique, examining retroviral DNA in Asian and Native American DNA, would have also had to mutate to the Asian variety within Native Americans. With similar results for all four genetic techniques, the founder effect would require at least 15 nearly simultaneous mutations that happened to match those of Asians in Lehi's sons and son's wives - not likely!

Not only do Mormon apologists have to deal with human genetics, they also have to explain the genetics of certain intestinal bacteria and domesticated dogs. In order for Native Americans to have been founded by Israelites, the *Helicobacter pylori* in their gut would have had to mutate to match that of the Asian variety. In addition, the dogs they took to the Americas would have had to mutate to an Asian type genetics. *All* of these six extremely improbable, multiple mutation effects would have had to have happened within a few generations in the same small populations. The idea is scientifically ludicrous.

## Genetic drift

Could genetic drift explain the lack of Jewish genetic markers in Native Americans? A study of mtDNA from 108 individuals from 700 year old burial site confirmed the founding populations originated 23,000-37,000 years ago.<sup>21</sup> The same kinds of haplotypes were found in the ancient

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<sup>38</sup> And it came to pass in this year there began to be a war between the Nephites, who consisted of the Nephites and the Jacobites and the Josephites and the Zoramites; and this war was between the Nephites, and the Lamanites and the Lemuelites and the Ishmaelites. Now the Lamanites and the Lemuelites and the Ishmaelites were called Lamanites, and the two parties were Nephites and Lamanites. (*Book of Mormon:Mormon 1:8-9*)

For behold, it came to pass that the Zoramites became Lamanites; therefore, in the commencement of the eighteenth year the people of the Nephites saw that the Lamanites were coming upon them; therefore they made preparations for war; yea, they gathered together their armies in the land of Jerushon. (*Book of Mormon:Alma 43:4*)

And there was also a cause of much sorrow among the Lamanites; for behold, they had many children who did grow up and began to wax strong in years, that they became for themselves, and were led away by some who were Zoramites, by their lyings and their flattering words, to join those Gadianton robbers. (*Book of Mormon:3 Nephi 1:29*)

<sup>39</sup> Wherefore, it came to pass that I, Nephi, did take my family, and also Zoram and his family, and Sam, mine elder brother and his family, and Jacob and Joseph, my younger brethren, and also my sisters, and all those who would go with me. And all those who would go with me were those who believed in the warnings and the revelations of God; wherefore, they did hearken unto my words. (*Book of Mormon:2 Nephi 5:6*)

remains as those seen today, indicating that not much genetic drift had occurred over the last 700 years. Even more convincing was the analysis of 10,000+ years old mtDNA from Alaska that matched Native American DNA from California, Illinois, Mexico, Ecuador and Chile.<sup>22</sup>

The kinds of studies that have been done on Native Americans have also been done on some Africans, specifically the Lemba tribe from South Africa, who claimed to have Jewish roots. What is remarkable is that the time frame is almost exactly the same as that claimed by the *Book of Mormon*. Here is an excerpt from the prestigious journal *Science*:

Genetic evidence also supports the oral tradition that the Lemba, who are now Bantu-speaking people of southern Africa, derive from Jews who migrated from the Middle East to Yemen 2700 years ago and from Yemen to southern Africa 2400 to 2000 years ago. More than 50% of Lemba Y chromosomes carry haplotypes that are common among Jewish populations but absent in their African neighbors (17). Genetic analysis has also confirmed the distinctiveness of the Cohanim, or traditional Jewish priesthood.<sup>40</sup>

Although the Lemba physically look like their black neighbors, their genetics clearly indicate that they are one of the “lost” tribes of Israel. The idea that all the Jewish genes could be lost through genetic drift in a population of Native Americans in only 2,700 years is absurd.

## Other people groups make up the majority of Native Americans

It is possible that other people groups are the primary ancestors of the Native Americans? Of course, this explanation ignores or falsifies the clear teaching found in the *Book of Mormon* Introduction, that claims that the Lamanites “are the *principal* ancestors of the American Indians” (italics added).<sup>41</sup> The Lamanites could not be the *principal* ancestors of the Native Americans if they were only a minority contributor. The *Book of Mormon* does mention other people groups. Of course, the *Book of Mormon* indicates that the Nephites were in the Americas, but were *all* wiped out in 385 A.D. by the Lamanites.<sup>42</sup> Even if any were left, they were also of Jewish origin, so would be expected to carry Jewish genes.

Another possible people group is the Mulekites, from the Book of Omni. The Mulekites had come out of Jerusalem at the time of the Jewish captivity by the Babylonians in 586 B.C. Although the *Book of Mormon* does not specifically mention how they reached the Americas, the

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<sup>40</sup> Owens, K. and M. King. 1999. Genomic views of human history. *Science* 286: 451-453.

<sup>41</sup> Book of Mormon Introduction: “The Book of Mormon is a volume of holy scripture comparable to the Bible. It is a record of God’s dealings with the ancient inhabitants of the Americas and contains, as does the Bible, the fulness of the everlasting gospel. The book was written by many ancient prophets by the spirit of prophecy and revelation. Their words, written on gold plates, were quoted and abridged by a prophet-historian named Mormon. The record gives an account of two great civilizations. One came from Jerusalem in 600 B.C., and afterward separated into two nations, known as the Nephites and the Lamanites. The other came much earlier when the Lord confounded the tongues at the Tower of Babel, This group is known as the Jaredites. After thousands of years, all were destroyed except the Lamanites, and they are the principal ancestors of the American Indians.” (*Book of Mormon:Introduction Preface:1-2*)

<sup>42</sup> And now it came to pass that after the great and tremendous battle at Cumorah, behold, the Nephites who had escaped into the country southward were hunted by the Lamanites, until they were all destroyed. (*Book of Mormon:Mormon 8:2*)

Book of Helaman from the *Book of Mormon* records that "the Lord brought Lehi to the land south and Mulek to the land north." (Helaman 6:10).<sup>43</sup> However, since these people were also of Jewish origin, they would be expected to express Jewish genetics.

Over 1000 years before the arrival of the Nephites, the Jaredites, who had their origins at the Tower of Babel, had arrived in the New World, according to the *Book of Mormon* (Ether 1-2). However, the Jaredite nation underwent a devastating war, which completely erased their civilization. According to the *Book of Mormon* introduction, "The other [Jaredites] came much earlier when the Lord confounded the tongues at the Tower of Babel. This group is known as the Jaredites. After thousands of years, all were destroyed..."<sup>44</sup> There is one possible exception, being one of the leaders, Coriantumr. According to the Book of Ether, introduction to the 15<sup>th</sup> chapter, "The Jaredite nation is utterly destroyed—Only Coriantumr remains".<sup>44</sup> The presence of only one male among a population of founders could never remove all remnants of Jewish genetics, since this man would not influence the mtDNA genetics at all, since those genes are passed only maternally.

## The Lamanites were only a small group of people in Central America

Some Mormons claim that the Lamanites were only a small group of people who were geographically restricted to a particular location, such as Central America. However, other Mormon scripture indicates that the Lamanites *are* peoples on the North American continent.<sup>45</sup> For example, *Doctrine and Covenants* Section 28 says that the city of Zion will be built "on the

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<sup>43</sup> Now the land south was called Lehi, and the land north was called Mulek, which was after the son of Zedekiah; for the Lord did bring Mulek into the land north, and Lehi into the land south. (*Book of Mormon:Helaman 6:10*)

<sup>44</sup> Millions of the Jaredites are slain in battle—Shiz and Coriantumr assemble all the people to mortal combat—The Spirit of the Lord ceases to strive with them—The Jaredite nation is utterly destroyed—Only Coriantumr remains. (*Book of Mormon:Ether 15:Heading*)

Two groups of Jaredites battled at Cumorah Hill in New York state. The armies destroyed each other until only the two leaders were left. Coriantumr killed Shiz, therefore being the only survivor:

Wherefore, he did pursue them, and on the morrow he did overtake them; and they fought again with the sword. And it came to pass that when they had all fallen by the sword, save it were Coriantumr and Shiz, behold Shiz had fainted with the loss of blood. And it came to pass that when Coriantumr had leaned upon his sword, that he rested a little, he smote off the head of Shiz. And it came to pass that after he had smitten off the head of Shiz, that Shiz raised up on his hands and fell; and after that he had struggled for breath, he died. And it came to pass that Coriantumr fell to the earth, and became as if he had no life. (*Book of Mormon:Ether 15:29-32*)

<sup>45</sup> Wherefore, it is an abridgment of the record of the people of Nephi, and also of the Lamanites--Written to the Lamanites, who are a remnant of the house of Israel; and also to Jew and Gentile--Written by way of commandment, and also by the spirit of prophecy and of revelation--Written and sealed up, and hid up unto the Lord, that they might not be destroyed--To come forth by the gift and power of God unto the interpretation thereof--Sealed by the hand of Moroni, and hid up unto the Lord, to come forth in due time by way of the Gentile--The interpretation thereof by the gift of God. (*Book of Mormon:Title Page 1:2*)

Mormon invites the Lamanites of the latter days to believe in Christ, accept his gospel, and be saved--All who believe the Bible will also believe the Book of Mormon. (*Book of Mormon:Mormon 7:Heading*)

And now, behold, I would speak somewhat unto the remnant of this people who are spared, if it so be that God may give unto them my words, that they may know of the things of their fathers; yea, I speak unto you, ye remnant of the house of Israel; and these are the words which I speak:

Know ye that ye are of the house of Israel. (*Book of Mormon:Mormon 7:1-2*)

Which is my word to the Gentile, that soon it may go to the Jew, of whom the Lamanites are a remnant, that they may believe the gospel, and look not for a Messiah to come who has already come. (*Doctrine and Covenants:Section 19:27*)

borders by the Lamanites.”<sup>46</sup> Several *Doctrine and Covenants* Sections indicate that Mormon leaders were to “preach to the Lamanites”<sup>47</sup> At one point, the text specifically relates the Lamanites to the “Indian tribes in the West”<sup>48</sup> and that at least part of this borders on the land of Missouri.<sup>49</sup>

In addition to the standard works, the standard Mormon teaching book, *Gospel Principles* teaches that the Lamanites are alive and numerous throughout the Americas:

**“The Lamanites Will Become a Great People**

The Lord said that when his coming was near, the Lamanites would become a righteous and respected people. He said, “Before the great day of the Lord shall come,... the Lamanites shall blossom as the rose” (D&C 49:24). Great numbers of Lamanites in North and South America and the South Pacific are now receiving the blessings of the gospel.”<sup>50</sup>

In order to claim that the Native Americans are not Lamanites, one would have to admit that much of Mormon scripture and official current teaching is false.

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<sup>46</sup> And now, behold, I say unto you that you shall go unto the Lamanites and preach my gospel unto them; and inasmuch as they receive thy teachings thou shalt cause my church to be established among them; and thou shalt have revelations, but write them not by way of commandment. And now, behold, I say unto you that it is not revealed, and no man knoweth where the city Zion shall be built, but it shall be given hereafter. Behold, I say unto you that it shall be on the borders by the Lamanites. (*Doctrine and Covenants: Section 28:8-9*)

<sup>47</sup> Revelation given through Joseph Smith the Prophet to Oliver Cowdery, at Fayette, New York, September 1830. HC 1:109-111. Hiram Page, a member of the Church, had a certain stone, and professed to be receiving revelations by its aid concerning the upbuilding of Zion and the order of the Church. Several members had been deceived by these claims, and even Oliver Cowdery was wrongly influenced thereby. Just prior to an appointed conference, the Prophet inquired earnestly of the Lord concerning the matter, and this revelation followed. 1- 7, Joseph Smith holds keys of the mysteries, and only he receives revelations for the Church; 8-10, Oliver Cowdery is to preach to the Lamanites; 11-16, Satan deceived Hiram Page and gave him false revelations. (*Doctrine and Covenants: Section 28:Heading*)

Revelation given through Joseph Smith the Prophet to David Whitmer, Peter Whitmer, Jun., and John Whitmer, at Fayette, New York, September 1830, following the three-day conference at Fayette, but before the elders of the Church had separated. HC 1:115-116. Originally this material was published as three revelations; it was combined into one section by the Prophet for the 1835 edition of the Doctrine and Covenants. 1- 4, David Whitmer is chastened for failure to serve diligently; 5- 8, Peter Whitmer, Jun., is to accompany Oliver Cowdery on a mission to the Lamanites; 9-11, John Whitmer is called to preach the gospel. (*Doctrine and Covenants: Section 30:Heading*)  
And be you afflicted in all his afflictions, ever lifting up your heart unto me in prayer and faith, for his and your deliverance; for I have given unto him power to build up my church among the Lamanites; (*Doctrine and Covenants: Section 30:6*)

<sup>48</sup> Revelation given through Joseph Smith the Prophet to Parley P. Pratt and Ziba Peterson, October 1830. HC 1:118-120. Great interest and desires were felt by the elders respecting the Lamanites, of whose predicted blessings the Church had learned from the Book of Mormon. In consequence, supplication was made that the Lord would indicate his will as to whether elders should be sent at that time to the Indian tribes in the West. The revelation followed. 1-3, Parley P. Pratt and Ziba Peterson are called to preach to the Lamanites and to accompany Oliver Cowdery and Peter Whitmer, Jun.; 4-5, They are to pray for an understanding of the scriptures. (*Doctrine and Covenants: Section 32:Heading*)

<sup>49</sup> And thus you shall take your journey into the regions westward, unto the land of Missouri, unto the borders of the Lamanites. (*Doctrine and Covenants: Section 54:8*)

<sup>50</sup> *Gospel Principles* 1997. The Church of Jesus Christ of Latter Day Saints, Salt Lake City, Utah, p. 268.

## **Conclusions**

Scientific studies conclusively show that the major claim of the *Book of Mormon* that Israelites are the principle ancestors of Native Americans is false. In fact, there are *no* Native American populations that share ancestry with Israelites. Attempts to wiggle out of the obviously false claims of the *Book of Mormon* and *Doctrine and Covenants* simply invalidate large amounts of Mormon “scripture.”

*“Every word of God is flawless; he is a shield to those who take refuge in him. Do not add to his words, or he will rebuke you and prove you a liar.” (Proverbs 30:5-6)*

Discusses the genetic code and molecular clocks as evidence for evolution. % Progress. MEMORY METER. Beginning in the 1940s, scientists studying molecules and DNA have confirmed conclusions about evolution drawn from other forms of evidence. Molecular clocks are used to determine how closely two species are related by calculating the number of differences between the species' DNA sequences or amino acid sequences. These clocks are sometimes called gene clocks or evolutionary clocks. The fewer the differences, the less time since the species split from each other and began to evolve into different species ( Figure below ). A chicken and a gorilla will have more differences between their D...